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Oh the Places We Will Go...

I have been asked as the founder and director of the Educational Enterprise Zone® (EEZ) to speak about the future of our consortium. To make sense of the future, it is imperative that we understand the core values and history of our consortium. Knowing where we've come from, the progress we've made together, and even the areas where we've fallen short of our ideals can be a productive learning experience. So, I'll start by looking at where we've been and then discuss the places I hope we'll go.

Where we've been

New York Institute of Technology's EEZ grew out of two debates that were going on when the college was thinking about transitioning its K-12 education efforts from a Department of Education to a School of Education. The first debate centered on whether teaching is a science or an art, method or magic, pure planning or pure inspiration. The second debate was about what might happen once schools, libraries, community centers and homes were connected with newly emerging communications technologies.

What surfaced from these debates was the motto for the Technology Based Learning Systems (TBLS) department of NYIT: **Encourage the Heart and Enable the Mind®**. It was under this banner that a model of technology-enhanced teaching and learning emerged, combining the best of both science and magic. That model was and still is based on the **E⁴** instructional framework, which serves as the foundation for the School of Educational and Professional Services at NYIT:

- **Entice**
- **Encourage**
- **Enable**
- **Empower**

In this context, an *ad hoc* think tank called the "Lower New York Planning Group" was

convened at the Central Islip campus, with a mission to address specifically what a technology-enhanced communications and educational system would and should look like. The group had representation from school boards, libraries, museums, parents, colleges and universities, superintendents of schools, public and non-public classroom teachers, school building administrators, as well as business and industry. This group arrived at a number of beliefs:

- 1) It made no sense to simply replicate the traditional content and methods of delivering instruction.
- 2) A new learner was emerging whose interactions with the world are centered in a new literacy that combines media and technology with traditional text-based literacy.
- 3) To enable the mind we must open the walls of our classroom and bring in the many robust resources that reside in the informal educational community.
- 4) Every student is born as a constructivist, that is, seeks knowledge and meaning through the celebration of understanding and experience.
- 5) All learners should be both creators and receivers of knowledge.

The group decided that a structure was needed that could bridge the formal community of educators with the community of informal educational settings (such as museums, science centers, and more) while building upon existing networks and delivery systems. Together, the debates, the motto, and the beliefs articulated by the Planning Group gave birth to New York Institute of Technology's Educational Enterprise Zone®. The structure that became the operational backbone of the Educational Enterprise Zone® views the world through three lenses:

Learner—The intended audience (K-12 schools, colleges and universities, libraries, community centers, etc)

Intermediate Unit—The social/political entity that deals in an organized way with the learner

Content Provider—The deliverers of the content

The Lower New York Planning Group further decided that NYIT's EEZ would be a confederation consisting of independent organizations working towards the goal of educating learners to participate fully in our society. The common thread linking all of us in the EEZ confederation is the belief that we have an obligation to rejoice in education and in the learning abilities of *all* learners.

The delivery goal was to use emerging communication technologies to create virtual connections between organizations. A major operating principle was that all learners would, to borrow a phrase from the physics world, "be both a source and sink of information," and that all activities supported by the EEZ would celebrate the skills and knowledge of the receivers as well as the providers.

Using major funding from NYNEX (Duane Albro, VP) and the Hitachi Foundation, NYIT's TBLS research lab began to look at the available technologies and to develop the technology further, along with pedagogical approaches for using it. These approaches had their roots in early pilot projects done with the New York City Department of Education and Steve Kohn from NYNEX. The product of the lab was a model that virtually removed the walls of the classroom and replaced them with virtual windows into a vast community of resources. What we replaced was an older model, which suggested that something was missing—that a hole needed to be filled. In our new model, we opened the learning environment so that information could flow freely, both in and out. In

this communications-rich virtual learning space, we could celebrate art, science, music, history, culture and all of the human experience in a bi-directional exchange between informal educational resources and the formal education system.

Since then, using videoconferencing as the primary technology, and constructivism as an

A major operating principle was that all learners would "be both a source and sink of information."

instructional framework, content providers and learner communities have worked together to build activities that "Encourage the Heart and Enable the Mind." They have moved the concept of media delivery from broadcasting to privatecasting. As companies like Tandberg, SONY and Polycom lowered the cost of the equipment and the cost of bandwidth decreased, the reach of the EEZ has increased dramatically. We now stand at almost 100 content providers and thousands of schools and libraries.

Where we're headed

So the question is, "What is the future of the EEZ?" To answer that question we need to look at both our successes and our failures. Since it is always more pleasant, let's start with our successes. One of the major achievements of the EEZ has been its research and development with emerging technologies. We have been able to identify needs and then work with the supplying vendors to meet those needs, so that we can maximize the bi-directional experience for both the provider and the receiver. TBLS has been instrumental also in developing bridging technologies and helping to develop customized compression-decompression packages that best meet the needs of the community. At the same time, we've worked with content providers and schools to create constructivist instructional models. The EEZ has always stood at the "bleeding edge," blending merging technology within constructivist pedagogy. At this edge, we have rejoiced in our success and learned significantly from our noble failures. Risk-taking and innovative

New Tools

Asynchronous

Blogs

Manila™

<http://manila.userland.com/>

Online Conferencing

Caucus

<http://www.caucuscare.com>

Video-on-Demand

Safari Montage™

<http://www.safarimontage.com>

Apple's Video iPods

<http://www.apple.com>

Voice Discussion Board

Horizon Wimba

<http://www.horizonwimba.com>

Video Email

Viditalk™

<http://www.viditalk.com>

Synchronous

Webinar

Elluminate™

<http://www.illuminate.com>

thinking have allowed us to push the envelope, but these endeavors have not been without their disappointments.

When we started the EEZ, the goal was to move away from a broadcast, uni-directional environment toward “narrowcasting” in a bi-directional delivery system using videoconferencing. We moved from the learner being simply a receiver of knowledge to a bi-directional exchange of information and inquiry.

Although we were very successful in going from the broadcast model to the narrowcast model, we achieved less in terms of focusing on individual student needs, promoting participation by all learners, and sustaining a learning connection beyond the “event.” The seeds of the EEZ’s future reside in these disappointments. Once again, we need to return to our original approach of pushing the envelope.

Accordingly, an innovative model of privatecasting to meet the needs of individual students is one of the new horizons for the EEZ. In order to build this model, we must first be able to use data being acquired through standardized testing, under *No Child Left Behind*, so that the providers can modify and/or build new programs that meet specific gaps in student performance. We will move from “If we build it they will come” to an environment where they will come because they have a specific need that we are able to meet. This will also change the view of content as enrichment to content as an integral part of the educational delivery system for the classroom.

Most programs to date are loosely tied to learning standards from one or two states. Our new approach will need to drill further into the standards so that the programs are aligned to specific learning outcomes. The goal will be to address student needs in specific locales. For example, the EEZ is currently working with Region One in the Bronx, NY, and with a number of content providers to create and modify programs that are aligned directly to the gaps in performance identified by the data obtained from school testing.

At the same time, the nature of emergent and emerging communications technologies will also transform the character and duration of the interaction between content providers and learners. Ongoing research and development done by the EEZ will allow us to match program content not only to student needs, but also to an appropriate blend of delivery technologies. The features and blending of these technologies will allow intimate and sustained dialogue. It is critical to understand that the majority of our learners are “digital natives”—learners who have grown up in a technology-infused environment—and that they have an expectation of interaction and response that is significantly different from past generations of learners. Digital natives expect both deeper interaction and a long-term learning discourse. The manner in which they process and communicate information must be incorporated into our designs.

How will we get there?

So how do we begin to incorporate new technologies to broaden our instructional model toward one of distributed learning? Let’s look at the available tools. Communications technologies can be broken down into two basic categories: synchronous and asynchronous. In

the synchronous environment, all parties must be “connected” at the same time. Although they can be thousands of miles apart, they must be able to find a common time to interact. In an asynchronous environment, however, the parties can be separated by both space and time.

One of the first issues we need to deal with in the synchronous environment is the problem of enabling more students to participate, allowing them to participate more frequently and at a deeper level.

The EEZ is dealing with this problem in a number of ways. We have installed 32 ports of transcoding bridging technology (Codian and Accord), which allows us to connect members who use different communications (ISDN and IP) together, as well as to do multipoint conferencing. This includes multiple content providers working with a group of learners, as well as a single content provider working with multiple learning groups. At the same time, we are working with content providers to modify their programs instructionally to take advantage of the multiple site capability while making the multipoint model more effective instructionally. In this way, rather than simply adding more sites, and thus limiting participation, we can help content providers adjust their programs so that the addition of sites becomes an asset that enhances the learning experience.

Recording and streaming

The EEZ has also upgraded its bridge, adding the capability to record the live session as well as to stream that session out through the Internet (Codian IP VCR). Recording the live session offers a number of new opportunities. For example, a content provider may have a one-time presentation by a visitor to its location. This can be saved and then shared with an audience later, either as a program itself or as part of a program. Streaming capability will allow the content provider to make available a view-only session of a videoconference, allowing special events to be shared with larger numbers of learners. A recorded session could also allow learners to review the content for reflection or use it as a reference for ongoing dialogue through an asynchronous communications tool.

Putting it all together

At first glance, these two strategies seem to suggest a reduction in the participation of the learner, but that is exactly what would happen if we did not also deploy a method by which learners continue to interact after

a videoconference, either with other learners or with the content providers. Such interaction can be done inexpensively via computer conferencing (bulletin board) systems and blogs. The EEZ supports both blogging and computer conferencing for its members and is helping the content providers create instructional activities which take advantage of these applications

Ongoing EEZ research and development will allow us to match program content not only to student needs, but also to an appropriate blend of delivery technologies.

to sustain and extend the interaction. For example, a content provider might run a session in which three sites participated live via videoconferencing, three viewed it in real-time via Internet streaming, and six viewed a recording. After the session, all 12 groups could continue learning with activities either moderated by the content provider or self-moderated by the participating groups. The capabilities of asynchronous discussion technology allow for each student or group of students to work independently or in small or large clusters. Asynchronous tools have been shown to increase reflective responses by providing the learner with “processing time” to analyze and explore before responding. This allows us to narrow the focus to a specific set of learner needs while providing a learner with the ability to deeply reflect on the content.

Additional asynchronous tools have been put in place by the EEZ to support the delivery of programs and to create new revenue opportunities for the content providers. These tools include video-on-demand (VOD), voice discussion boards, video email, and podcasting and videocasting.

Utilizing the video-on-demand system, providers will be able to store video footage, recorded programs and special events as a database of video resources. Then, stored elements can be used to supplement live programs or be used in a pay-per-view arrangement.

iPods, Wimbas, and VODs, oh my!

In the Fall of 2006, we'll conduct an experiment using Apple's Video iPod and the Safari Montage™ VOD system. This experiment will allow us to download specific content geared to an individual learner's needs. The video can be downloaded at school and then viewed at home, allowing us to expand the reach of the programs and the depth of preparation that the students will have.

The voice discussion board, Horizon Wimba, enables learners to engage in continued discourse after VC sessions, using both text and voice. To this capability we are adding both podcasting and videocasting, which will allow content providers to update receivers on their programs and provide ongoing support material.

The newest tool to be added to the asynchronous tool set is video email, Viditalk™. It enables content providers to send introductory video material or promotional video clips to the receivers, using nothing more than a traditional "eyeball" camera and an Internet connection. Each video email can contain text as well as active links to web resources.

To view samples of these asynchronous tools you can connect to the EEZ website at <http://www.nyiteez.org/eeztools.htm>.

On the synchronous side, the EEZ has also added webinar (seminar on the web) software. Elluminate™ allows users to enter a virtual learning space with the ability to communicate by voice, raised

hands, and shared PowerPoint presentations. They can also view video and Flash clips, share software applications, go in and out of breakout rooms and see each other via live video. All of this functionality can be conducted over both low and high bandwidth Internet connections. A provider can connect with as many as 200 users at once, all of whom can have full functionality, plus the entire interaction can be recorded and viewed later.

The key to incorporating these new tools effectively will be making sure that the programs are enhanced rather than limited by them. It will be critical for us not to give in to the technology fad of the month, but rather apply technologies so that they improve the instructional experience, the goal being to broaden the instructional model.

And we're not through yet...

As much as we may hate to admit it, this leads us to another disappointment—our inability to adequately address issues of equity and diversity. As a community, the EEZ must look deeply into its support structures to make sure we are providing an experience that invites all and is accessible by all. The first issue we need to confront in this arena is access to programs. Looking at the requests for scheduled programs, we see a clear representation of suburban and affluent areas. This is a matter of both the infrastructure available in the receiving environments, as well as the ability to afford program fees. The EEZ has been trying to deal with the cost issue via the creation of an equity "bank" where content providers donate programs that can be withdrawn by schools in need. We are also actively pursuing funding through grants and contracts targeted toward providing access.

It is also critical that we continue to search for low-cost technology. Elluminate™ and low cost videoconferencing equipment, for example, can allow us to provide access to many more schools, libraries and community centers. Besides educating our receiver members to these cost-saving applications, the EEZ University will concentrate on preparing the content providers to use these tools to reach a wider audience.

Diversity is the other side of the equity coin; we must also provide programs that both enhance and encourage it. The traditional broadcast media made the mistake of reflecting only a narrow part of society when it began. We cannot repeat that mistake. The EEZ will be seeking funding for projects that

New EEZ Goals

Meeting Individual Student Needs

- Utilize data from standardized testing
- Address achievement gaps
- Use blended technologies to extend learning

Offering Equity of Access

- Donated programming
- Lower-cost technology
- Access grants and contracts

Encouraging Diversity

- Minorities
- Marginalized populations
- Authentic voices

reflect “authentic voices,” that is, projects that authoritatively represent minorities and other marginalized populations. We will actively recruit all segments of our society to become EEZ receivers and providers, and we’ll begin by inviting museums that represent Hispanic, Native American and African American cultures, as well as those that represent women. The new programs we develop must celebrate the strength of our differences by showing learners people who are just like themselves. We have the ability, content and the resources to shape a diverse learning community—it is our obligation to do so.

Our invitation

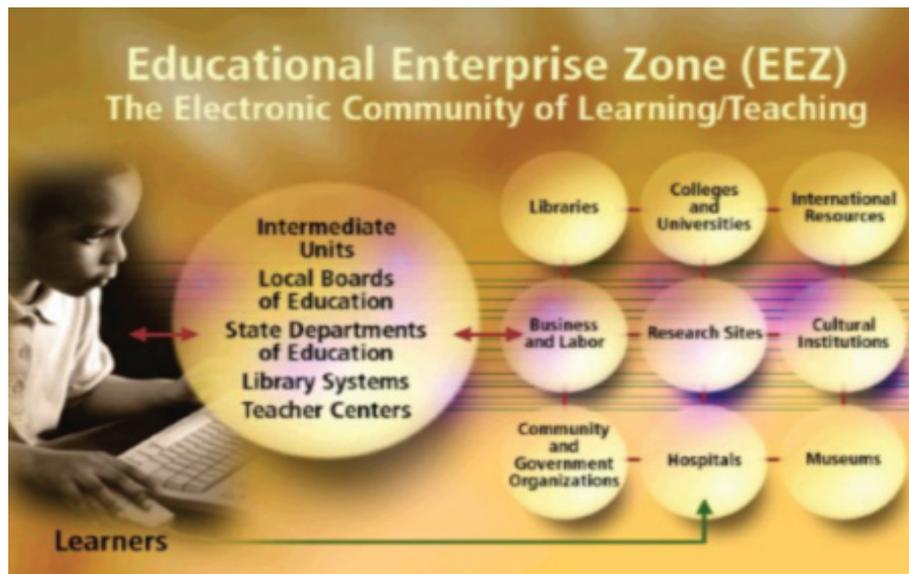
As a community, we have grown and learned from each other, and we will continue to do so. Our strength will always be in our commitment to the learners and this is the critical motivation driving us forward. As we incorporate new technologies, focus on meeting achievement gaps by providing learning opportunities beyond a single event, provide for

greater access by underserved groups and strive to showcase diversity, our consortium will not only grow in numbers, but also mature in character.

It costs nothing more than the price of a postage stamp. If you are not already a member and would like to join our confederation, please see <http://www.nyiteez.org> for details. ■



Stan Silverman
 Director, EEZ
 Director, Technology Based
 Learning Systems
 Professor of Education, New York
 Institute of Technology



Our Heroes

In every issue, we honor certain outstanding colleagues who have made significant contributions to the growth of standards-based, constructivist, interactive videoconferencing in K-12 classrooms. Each of them has made particular strides that we wish to celebrate and share.

Tommy Bearden

Texas Region 14 ESC

Tommy Bearden is proof that you don't have to be a technology expert to embrace videoconferencing. "I saw my first videoconference at a technology conference in 1996," explains Bearden, the Distance Learning Coordinator for the Region 14 Education Service Center, Abilene, TX. "At the time, I was a high school principal. I had a computer in my office that I used as a stand for my pencil sharpener. But



videoconferencing, its possibilities, fascinated me. As a principal, you spend 90% of your time with 10% of the student body. I wanted to do something with all of my students." In 1997, his high school in Stamford, TX, participated in its first videoconference. Subsequently, he brought high school and college courses into the school using the technology.

In 2000, Bearden became the DL coordinator for Region 14. "I do strictly content," he is quick

to point out, but that's clearly an understatement. Bearden works at the network's center in Abilene, where 42 schools can dial in for regular high school and college courses as well as special events. "In the beginning, we were doing a couple of connections per month. Now we do four or five videoconferences a day." In addition, Stamford High is a content provider. Students deliver an interactive, hands-on program about cotton, which is produced in the region. (For more about this program, visit <http://www2.stamford.esc14.net:1090/>)

Bearden brings original programming to children in Region 14 as well as around the state and around the country. Last year, for example, he organized a videoconference event for 3,500 Texas students. Ninety-one endpoints connected with 12 schools along the state's Brazos River. "Texas children have to learn about their state's history and geography," he notes. "The 12 schools talked about the river and their community." Bearden also worked with Long Island's Nassau BOCES. Twelve of his rural schools were matched with New York schools for writing and videoconferencing. And through a multipoint connection, high schools around the country were able to interact with a survivor of the World War II ship, the USS Indianapolis.

"Interactive videoconferencing is the next wave," concludes Bearden. "The opportunities aren't going to come to you, however. You have to make them happen."

Candace LeClaire

Lynda O'Leary

Philadelphia Museum of Art

The Philadelphia Museum of Art (PMA) is one of the pioneers of educational videoconferencing. In 1995, Bell Laboratories approached PMA to test new videoconferencing software. The museum agreed, connecting over the Internet with schools who had

the same software, and offered a single program. Today, PMA delivers 12 videoconference programs and is one of the most respected content providers, due in large part to the successful collaboration of Candace LeClaire and Lynda O'Leary.



PMA began to reach a wider audience when it acquired ISDN-based equipment through a Pennsylvania State grant called "Links to Learn" in 1997. At the time, LeClaire was a teacher at a Quaker school that was a recipient of the same grant. "I had an opportunity to experience videoconferencing from the teacher's point of view," she says. She joined PMA's Division of Education as Distance Learning Coordinator in 1999.

O'Leary joined PMA's education staff as Departmental Assistant in 1997. She became involved with the Distance Learning Program in 1999, and became a full-time DL teacher in 2001.

As a team, LeClaire and O'Leary can take credit for the growth of PMA's videoconference program in recent years. With their backgrounds, it's no wonder they are able to design thoughtful programs and provide expert delivery. In addition to a BA in Studio Art with a minor in Art History from the University of Maine, Orono, LeClaire has an MA in Museum Education and an MAT in Art Education from the University of the Arts, Philadelphia. She also holds a Pennsylvania State teaching certification. O'Leary has a BA in Art History from Temple University, Philadelphia. "In our program, not only do we introduce students to various artists and approaches, but we also try to establish a certain level of comfort in talking about the art and how it informs us about the world in which we live," explains LeClaire. (For more about PMA's videoconference lessons, visit <http://www.philamuseum.org>)

LeClaire's and O'Leary's enthusiasm for art and videoconference technology is evident in everything they do. "We really enjoy working with

students and teachers from all across the country," stresses O'Leary. "We love going into the classroom and becoming part of that environment. Feeling the children's excitement for art is so rewarding to us."

When asked about the future of videoconferencing, the PMA educators note they have seen many changes in both the technology and programming over the years. "We really believe videoconferencing is a significantly underused resource on the whole," says LeClaire. "However, we have been happy to see it grow steadily every year. We are excited and optimistic about the future."

Michael Manginelli TANDBERG

You might say that Michael Manginelli's 20 years in teleconferencing has brought him full circle. In recent years, Manginelli, Manager, Solutions Sales at TANDBERG, has had the opportunity to work with NYIT EEZ and Stan Silverman on many projects that have brought interactive video/graphic conferencing to New York area schools and content providing institutions. As a native New Yorker, he was eager to work on projects that included the Statue of Liberty and Ellis Island, the Bronx Zoo, Carnegie Hall and the National Baseball Hall of Fame. He was especially pleased to work with New York City Region One in the Bronx, which included public schools he attended as a child. "Students today are members of a TV-based culture," notes Manginelli. "It's not surprising to see them grasp interactive video/graphic distance learning."



Throughout his career, Manginelli's main focus has been the implementation of real time, interactive distance learning networks. Now with TANDBERG, he has created virtual video classrooms offering a complete solution that merges interactive video with audio, PC graphics and content from

A/V sources and educational content providers. “Today, we have the benefit of employing video with multimedia technology over high speed global networks that have been maturing for three decades and are now converging into a single collaborative medium,” he stresses. Some of Manginelli’s other accomplishments in K-12 include technology integrations in several New York State BOCES and Pennsylvania Intermediate Units as well as implementations in New Jersey, Connecticut, Louisiana and Massachusetts. In addition to NYIT, higher education projects include SUNY, CUNY, UCONN, MIT, Rutgers, Harvard and Yale.

While it’s clear that Manginelli has made significant contributions to the growth of distance learning in the Northeast, he states that, “the most satisfying moments are when you realize that you have been part of bringing educational opportunities to children that were previously not available to them without your technology.”

Tony Nappo

Middletown High School, NY

It’s hard not to think of that old adage about postmen—“neither rain, nor sleet, nor snow”—when you think of Tony Nappo. Recently, Nappo had to face unusual obstacles to bring videoconference training to teachers at Middletown High School, Middletown, NY. Somehow, this high school information technology teacher persevered, giving the teachers a very positive and informative videoconferencing introduction.



Nappo, who has been a classroom teacher since 1974, was first introduced to distance learning through the Orange County BOCES Distance Learning Network. For 12 years, Middletown High and eight other schools shared instructors who taught

social studies electives for 12th graders. The network, which ran over fiber optic lines, also specialized in courses such as college-level calculus and American Sign Language.

In the Spring of 2005, videoconferencing capabilities at Nappo’s school got a boost through the collaborative efforts of the EEZ, NYIT, and the Middletown Teacher Center. The school’s first connection involved Navy JROTC cadets videoconferencing with an official from the USS Intrepid Sea Air and Space Museum in New York City.

This past fall, Nappo, who earned a Master’s degree in Instructional Technology from NYIT in 2000, coordinated a 15-hour videoconference training program through the Project VIEW grant. Eight high school teachers, representing the art, science, social studies, special education, and ESL departments, participated in the training. In addition, the teachers developed instructional units that integrated a videoconference into their curriculum. Like other Project VIEW facilitators across New York State, Nappo provided an explanation of the technology and an introduction to the wide variety of available programs. However, to do so, Nappo had to reschedule the training sessions after a school fire (no one was hurt), building construction (he likened to a “war zone”), and a myriad of technology failures. Somehow, Nappo was able to keep his great sense of humor through it all.

When asked what the future holds, Nappo says he plans to facilitate connections between 11th graders and NYIT for a college orientation conversation and virtual tours of the campuses.

Despite the mishaps during Project VIEW, Nappo reports that the teachers are enthusiastic about technology and look forward to connecting their diverse student body with new venues and learning opportunities. Obviously, Nappo’s enthusiasm has rubbed off on them!

Oceanside School District

Oceanside, NY

How many times have you heard it said, “It takes just one person with enthusiasm for videoconferencing to get the entire faculty excited about the technology”? In the case of the Oceanside School District, it was one school’s enthusiasm for videoconferencing that led to district-wide excitement and a record number of videoconferences conducted during the 2004-05 school year.

In 1999, the Oceanside School District was a partner in a Title III Technology Literacy Challenge grant. Educators from Oaks School No. 3 were sent by the district to Nassau BOCES for training in technology. As a result of that training, the district decided to pilot the use of educational videoconferencing in School No. 3, an elementary



School No. 3, an elementary school in the Oceanside School District

school. A team of key staff members, including the library media teacher, the technology specialist, the principal and several classroom teachers, became excited about the curriculum-enriching possibilities of videoconferencing. Numerous workshops, staff meetings, actual videoconference connections and in-service courses were devoted to the topic. With the help of this team, teachers at Oaks School began integrating videoconferencing into their daily curriculum. The teachers realized that videoconferencing could be an effective tool for introducing, supporting and culminating a unit of study.

News of the stimulating videoconference connections being made at Oaks School quickly spread throughout the district. By 2004, hardware and technical support had been replicated in each of the district's nine schools. Once again, Nassau BOCES provided videoconferencing training. Several teachers participated in the Project VIEW grant, which provided additional funding for videoconference lessons. During the 2004-05 school year, Oceanside School District students engaged in more than 175 videoconferences.

Today, videoconferencing is an integral component of nearly all disciplines throughout the district, with students participating in both content provider and class-to-class connections on a regular basis. The learning experience for students in the Oceanside School District now reaches far beyond the four walls of their school buildings.

Larry Roher

Expedite Video Conferencing Services, Inc.

Larry Roher is a veteran—a veteran EEZ member, that is. Over the years, Roher has generously supported the EEZ in numerous demonstrations for content providers, pilot projects and proofs of concept, lending equipment and technical expertise where needed.

In 1997, Roher, CEO of Expedite Video Conferencing Services (VCS), recognized the technology's potential for bringing together the best minds and practitioners in any field, regardless of their geographic location. That year he founded Expedite VCS, a dealer of PictureTel's PCS100 and ProShare videoconferencing software for PCs, with primarily business clients. In just two years, Expedite VCS became the largest reseller in the Northeast and continued to establish itself as a leader in a variety of applications for videoconferencing in government, business, and education.

Roher has always had a vision for what videoconferencing could mean in K-12 classrooms. In 1997, he helped orchestrate a multipoint conference between high school students on Long Island, fourth-graders in Queens, NY, and a retired Supreme Court Justice. What was the occasion? A mock trial based on an actual case. The high school students had been studying tort law as part of their graduation requirements. Roher arranged for the students to be



briefed by actual attorneys. For the fourth-graders, he arranged a lesson about the responsibilities of a jury, taught from the bench by a Justice of the Nassau County Supreme Court. Finally, on the day of the event, the high school students presented their cases, with the retired Justice adjudicating and the fourth-graders acting as the jury. The students who participated that day not only learned about the law, but about civic responsibility as well.

Roher also lent a hand when the three Long

Island BOCES, in partnership with NYIT, won the Title III Technology Innovation Challenge grant. The grant launched the formal infrastructure of the EEZ. It was Roher who negotiated the volume pricing that enabled the BOCES sites to offer a stand-alone VC unit to all 126 Long Island school districts.

Since then, Expedite VCS has emerged as an integrated service provider throughout New York State and has grown into a worldwide communications company that provides solutions to enterprise level clients. Still, Roher isn't satisfied. Today, he's excited by an innovative technology that has the potential to change the way content providers and intermediary agencies service schools. "This new technology is amazing," he says. The new technology he is referring to is a proprietary software program that provides a flexible, easy to use web-based platform to schedule videoconferences, reserve rooms, bridge ports and equipment, send invitations and track responses. The program, called Versatile Resource Manager or VRM, interfaces with both Lotus Notes and Outlook and can even generate a wide variety of usage reports. (For more information see <http://myvrm.com/index.cfm>)

David Shaw

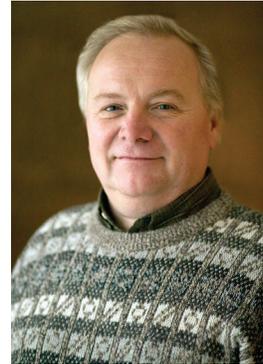
Cleveland Museum of Art

Not many content providers can say they deliver their videoconference lessons from a mini-television studio. Cleveland Museum of Art (CMA) can, thanks in part to the technical expertise of David Shaw. As Technical Manager of Distance Learning, Shaw is responsible for all studio operations at CMA. This is no small feat, considering the museum conducted more than 900 videoconference programs during the 2004-05 school year.

Shaw joined the museum six years ago after many years in the television industry. "As a TV guy, all I ever saw was the one side of a transmission. What makes videoconferencing so great is the interactivity."

Shaw's the person behind the camera during CMA's highly interactive presentations. He cues images from the museum's collection for the Chroma Key, better known as the "green screen." Sometimes, questions from students or teachers take the discussion in an unforeseen direction. Shaw comes to the presenter's aid by instantly finding images that support the new conversational thread. "Early on in our videoconference program, we used

the 'news desk' format, where the presenter switched cameras to show the images. But we realized it was more engaging if the presenter stayed on camera the whole time. That's when we started using the green screen." (For more about CMA's videoconference lessons, visit <http://www.clevelandart.org/educef/distance/html/>)



What does Shaw see for the future of videoconferencing? "There's a lot of talk about e-education taking over distance learning," he says, "but educators recognize the importance of face-to-face interaction. I see videoconferencing and e-education supplementing each other. It will be a very powerful merger."

Shaw and his CMA colleagues will be moving into a new 1800-square-foot space with two studios and offices in July of 2006.

The above heroes join the following past honorees:

Jill Bell
Karen Buller
Joe DePersia
John Falco
Maria Fico
Gunter Grossmann
Krista Kohlhausen
Steve Kohn
Lee Livney
Susan Neale
Christianne Orto
Patti Reilly
April Kim Tonin
Kathleen Wojciechowski ■

The EEZ Standards

By Rose Tirotta

There are over 600 videoconference programs being offered by roughly 200 content providers. Some of the lessons are excellent, others are good, and many are poor. To ensure the best learning experience for their students, receivers began to set the bar for providers and their programs. Providers responded by trying to meet that bar. But the question remained: "What is the bar?" In education, everything is driven by "standards," but there was a void with videoconferencing. The EEZ consortium decided to come together to create a set of standards that clarify the benchmarks.

These rubrics were created with both providers and receivers in mind. Providers should use them as guidelines to assess their programs and technology. Receivers can use them to check their own transmissions and to help generate appropriate questions when interviewing providers about videoconference programs. For your convenience, we've published the complete EEZ Standards. But first, let's look at each category.

I. Capacity

Both providers and receivers should use this rubric to check their transmission quality. Both sides should have clear audio and video quality and an acceptable transmission delay. Peripherals should also be checked on both sides when applicable. Providers should be sure that their staffing falls in the 2-3 range on the rubric scale, while receivers should use these three rows to base their questions for providers. For example: What kind of technical support is available during the program? Is there a phone number/email to use for booking and questions? How long should it take for a response? Finally, providers should always make sure the location used to deliver their program is suitable.

II. Policies and procedures

Once again, these are issues that each content provider should be addressing and each content receiver should be asking about. For example, programs designed for a single class audience will

probably suffer when a provider agrees to do the program with multiple classes connected.

III. Content

When creating and reviewing programs, content providers should be aiming for the 2-3 range in this rubric. Many of these items will be what the receiver is looking for when searching for an appropriate program. Alignment to national and/or state standards is a particular item of interest to many receivers and may be a school district requirement when booking a videoconference. Being the expert and being able to give an experience the teacher cannot emulate in the classroom can all be found in this rubric. Ongoing interactivity is also vital to the successful program. In addition, higher order questioning skills and flexibility are items providers should be offering and receivers should be requesting.

IV. Presentation skills

As the name suggests, this rubric should help presenters as they prepare their programs. A 2-3 rating is pertinent in this rubric as well. For instance, the presenter who can respond well to a wide range of student questions is someone who will be very popular among receivers. But besides being useful for the content provider, these rubrics can help teachers prepare their students. Since a videoconference is two-way communication, students should be eager and ready to ask and answer questions. They should also think about their overall communication skills and appearance.

V. Evaluation

Providers are presenting programs to a wide variety of audiences. Each connection may mean a different grade level, different special needs, different standards to be met, a different content focus or maybe a combination of these or other goals. The only way the presenter can know whether he or she has successfully reached an audience is through assessment. It's important for the provider to have an assessment tool and for the receiver to complete it.

NYIT Educational Enterprise Zone® Videoconferencing Standards

3 = Requirement		0 = Does Not Meet Requirement	
3 = Optimal	2 = Acceptable	1 = Needs Improvement	0 = Unacceptable

I. CAPACITY: Technology and infrastructure support of program delivery needs

Audio Quality	3		0	
	-Commensurate with program needs -Clear throughout program		-Does not meet program needs -Difficult to hear or intermittent	
Video Quality	3		0	
	-Commensurate with program needs -Clear throughout program		-Does not meet program needs -Difficult to see or intermittent	
Transmission Delay (Latency)	3		0	
	Delay is within acceptable parameters (.375 seconds or less)		Delay exceeds acceptable parameters (more than .375 seconds)	
Peripherals	3		0	
	Commensurate with program needs, for example, a document camera is available to show maps, etc		Does not utilize proper peripherals to meet program needs	
Staffing: Administrative/ Clerical	3	2	1	0
	Staff responds to phone calls/emails within a 24 hour period	Staff responds to phone calls/emails within a 48 hour period	Staff responds to phone calls/emails within a 72 hour period	-Staff does not respond to phone calls/emails -Staff responds after a 72 hour period
Staffing: Technical Support	3		0	
	Content provider offers technical support during pre-program testing and throughout program delivery		Content provider does not offer technical support during pre-program testing and/or throughout program delivery	
Staffing: Instructional Support	3		0	
	-There is sufficient instructional staff to deliver program within a reasonable time from booking request -Trained backup presenter is available if the usual presenter is not -There is a published back-up plan if specialized content requires a particular expert who is unavailable for reserved delivery date		-Program impact is affected because of length of time between booking request and actual delivery -Program must be cancelled or postponed if usual presenter is unavailable -There is no back-up plan if specialized content requires a particular expert presenter who is unavailable for reserved delivery date	

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3 = Optimal	2 = Acceptable	1 = Needs Improvement	0 = Unacceptable

I. CAPACITY: Technology and infrastructure support of program delivery needs

	3	2	1	0
Delivery Location	Significantly enhances program impact by the use of either well-appointed studio space or on-location sites which are in accordance with best delivery practices both in content and technology	Complements program impact by the use of appropriate studio space or on-location sites which are in accordance with best delivery practices both in content and technology	Does not affect program impact either positively or negatively	Location is unsuitable and/or detracts from the program impact

II. POLICIES AND PROCEDURES: Formalized policies and procedures for program support on both the content provider and receiver levels

End-User Agreement	3	0
	There is a written end-user agreement that clearly states the services that a participant can expect	There is no written end-user agreement
Program Promotion	3	0
	Promotional materials provide complete and accurate information for end-user to make informed decisions	Program promotional materials are incomplete, inaccurate and/or misleading
Transmission Delay (Latency)	3	0
	Delay is within acceptable parameters (.375 seconds or less)	Delay exceeds acceptable parameters (more than .375 seconds)
Audience Size	3	0
	Program is designed for a single classroom and is delivered to a single classroom	Program is designed for a single classroom, but is delivered to more than one classroom
Pre-Conference Testing	3	0
	One bi-directional test within one week of delivery encompassing multiple connections to determine optimal speed is conducted	There is no pre-conference testing
Copyright Issues	3	0
	-Provider adheres to the TEACH ACT 2002 -Provider presents clear definitions and guidelines regarding copyright issues	-Provider does not adhere to the TEACH ACT 2002 -Provider does not present clear definitions and guidelines regarding copyright issues

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II. POLICIES AND PROCEDURES: Formalized policies and procedures for program support on both the content provider and receiver levels

Program Fees	3	0
	Program fee is commensurate with services rendered and is aligned to current market value	Program fee is disproportionate to services rendered and/or is not aligned to current market value
Refund Policy	3	0
	Written policy is given to receiver prior to booking	Written policy is not given to receiver prior to booking OR No written refund policy is in place

III. CONTENT: The curriculum, materials, and follow-up after the program, as well as the authority of the offering institution in the field of the content being presented

Institutional Credentials as to Program Content	3	0
	Recognized as expert in field of program content as determined by: -General public and/or professional recognition of institution as expert -Professional or peer certification or licensing where applicable OR Credible source of program content based on access to artifacts, documents, location, etc AND use of external expert to verify content accuracy	-Not recognized as expert in field -Not credible in field -Credible, but no use of external expert to verify content accuracy
Objects Used in Program	3	0
	-Authentic artifacts and documents are used where possible -Replicas and facsimiles are clearly identified	There is misrepresentation of the authenticity of artifacts and/or documents
Curriculum Design's Appropriateness to VC Environment	3	0
	-Maximizes the use of experts, artifacts, and primary source documents not available in the regular classroom setting -Design reflects an awareness of videoconferencing benefits and limitations	-Content and/or presentation is easily replicable in a traditional classroom setting -Design does not reflect an awareness of videoconferencing benefits and limitations, and might be detrimental to student learning

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III. CONTENT: The curriculum, materials, and follow-up after the program, as well as the authority of the offering institution in the field of the content being presented

Quality of Unit of Instruction: Standards-Based	3	2	1	0
	Program is aligned to National and State Learning Standards and identifies the most specific performance level available	Program is aligned to National and State Learning Standards	Program is aligned to National or State Learning Standards	Program is not aligned to either National or State Learning Standards
Quality of Unit of Instruction: Essential Question	3	2	1	0
	-Requires the application of the highest order of thinking skills to respond (Evaluation) -Extends immediate scope of program	-Requires the application of higher order thinking skills to respond (Synthesis, Analysis) -Extends immediate scope of program	Requires the application of basic thinking skills to respond (Application)	Requires the application of the simplest thinking skills to respond (Comprehension, Knowledge)
Quality of Unit of Instruction: Construction of Knowledge	3	0		
	Program content enables students to build on prior learning, construct meaning, create products, solve problems, reflect on learning and report their discoveries	Program content does not foster the construction of knowledge		
Quality of Unit of Instruction: Diversity	3	2	1	0
	Content proactively illustrates, embraces, and celebrates diversity	Content acknowledges and represents diversity in a positive manner	Content has been reviewed for acceptable representations of diversities	Diversities are presented in a stereotypical or negative manner
Quality of Unit of Instruction: Interactive Design	3	2	1	0
	Requires active participation throughout the connection	Encourages active participation throughout the connection	Participation is limited to question and answer format	Participation is not encouraged or required

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III. CONTENT: The curriculum, materials, and follow-up after the program, as well as the authority of the offering institution in the field of the content being presented

Quality of Unit of Instruction: Differentiated Instruction	3	2	1	0
	-Program activities and content are geared toward a wide variety of learning styles -Individual student activities allow for a variety of presentation formats (artistic, written, oral, etc)	Program activities and content are geared toward a variety of learning styles	Program provides activities and content that are limited to a few learning styles	Program makes no provisions for differentiated instruction
Quality of Unit of Instruction: Cross-Curricular Connections	3		0	
	Unit is interdisciplinary in nature as evidenced by the Learning Standards it addresses		Unit does not demonstrate cross-curricular connections	
Quality of Unit of Instruction: Wrap-around Lessons	3	2	1	0
	Formal unit plan with standards-based pre, post and VC lessons is provided which bring participants beyond factual content and allows them to apply and transfer learned content	Informal, standards-based pre, post and VC lessons are provided which bring participants beyond factual content	Pre and post activities are provided	No supporting learning material is offered
Quality of Unit of Instruction: Follow-Up	3	2	1	0
	-Access to the institution is provided for follow-up questions and discussions with expert, curator, docent, educator, and/or interns -Follow-up activities are reviewed and commented upon by institution	Access to the institution is provided for follow-up questions and discussions with expert, curator, docent, educator, and/or interns	Program offers a website or other resource for follow-up and extension activities	No provisions are made for follow-up

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III. CONTENT: The curriculum, materials, and follow-up after the program, as well as the authority of the offering institution in the field of the content being presented

Quality of Unit of Instruction: Supporting Media	3	0
	-Professional in both content and form -Used appropriately to enhance program	-Detracts from program -Is of poor quality -Is not used
Grade/Ability Appropriate	3	0
	Content and materials are appropriate for marketed grade and/or ability level	Content and/or materials are not appropriate for marketed grade and/or ability level
Duration	3	0
	Length of program is appropriate for audience and content	Length of program is inappropriate for audience and content
Customization	3	0
	Provider offers reasonable customization to meet participant needs if requested by receiver. For example, content emphasis is shifted in light of prior student learning as determined during pre-conference discussion	Provider offers no opportunity for customization

IV. PRESENTATION SKILLS: Delivery of the videoconference referencing skill of presenter

Appearance	3	2	1	0
	-Adds impact to content and context of program through appropriate costumes, etc -Adheres to best practices for dress during a VC	-Suitable to content and context of program -Adheres to best practices for dress during a VC	Adheres to best practices for dress during a videoconference	Detracts from the impact of the program

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IV. PRESENTATION SKILLS: Delivery of the videoconference referencing skill of presenter

	3	2	1	0
Communication Skills	Presenter has exceptional: -Eye/camera contact -Clarity of speech -Use of age appropriate language -Projection of enthusiasm/passion for subject area -Ability to establish rapport with audience	Presenter has good: -Eye/camera contact -Clarity of speech -Use of age appropriate language -Projection of enthusiasm/passion for subject area -Ability to establish rapport with audience	Presenter has average: -Eye/camera contact -Clarity of speech -Use of age appropriate language -Projection of enthusiasm/passion for subject area	Presenter has poor communication skills
Questioning Skills	-Encourages participation through properly phrased questions -Allows appropriate wait time -Asks questions that require higher order thinking skills and flow from content in context -Includes follow-up questions that are thought provoking and extend student learning	-Encourages participation through properly phrased questions -Allows appropriate wait time -Asks questions that require higher order thinking skills and flow from content in context	-Encourages participation through questioning -Allows appropriate wait time	Questions do not move content forward, are poorly phrased, are insufficient in quantity and/or impede program because of level of difficulty
Response Skills	Responds to a variety of questions with a high degree of competency, in a thought-provoking manner, and on a level suitable for the audience	Responds to a variety of questions with a good degree of competency and on a level suitable for the audience	Follows script and answers low and higher order level questions adequately on a level suitable for the audience	Insufficient content knowledge to respond adequately to questions and/or to extend knowledge

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IV. PRESENTATION SKILLS: Delivery of the videoconference referencing skill of presenter

Integration of Pre-Conference Materials into Videoconference	3		0	
	Presenter integrates pre-conference materials into the videoconference effectively		Presenter does not integrate pre-conference materials into the videoconference	
Ability to Adjust Program Based on Instructional Conditions	3		0	
	Presenter can: -adjust presentation content based on student responses and questions -adjust presentation when interrupted by external interference such as announcements, alarms, etc		Presenter is inflexible in program delivery	
Proficiency in Equipment Use	3	2	1	0
	Presenter: -uses equipment proficiently and seamlessly throughout presentation -has the ability to unobtrusively troubleshoot if required	Presenter: -uses equipment adequately during presentation -has the ability to troubleshoot if required or ready access to technical support	Presenter has minimal working knowledge of equipment used in presentation	Presenter is unable to use equipment properly and/or effectively

V. EVALUATION: Critical looks at a provider's program throughout its lifetime, from piloting to presenting as an established program will be evaluated on the organizational level

Program Evaluation by Receiver	3	0
	Delivered program is formally evaluated by receiver and recommendations are considered during in-house assessments	Delivered program is not formally evaluated by receiver OR Program is evaluated, but recommendations are not considered

We would like to thank the EEZ members listed on our website who contributed to the creation of these rubrics. ■

Evidence of Impact

Provider-based videoconferencing and K-12 learning

By Dianna L. Newman, PhD

A great deal of research has been conducted on how students react to online computer or web-supported learning (eg, Bennet, 2002), but very little scientifically-based information is available to support the impact of videoconferencing between K-12 learners and external experts. Early research on videoconferencing and student learning yielded mixed results, at best. According to Speltz and Shaughnessy (1990), a clear understanding of student needs with a direct tie to classroom objectives was needed by providers for a successful “visit” to be achieved. Similar results were found by Furst-Bowe (1997), who reported no differences in student reactions when piloting videoconferencing unless instructors received training in appropriate use, and materials were integrated into and supported current instruction. Gernstein (2000) also found that if videoconferencing was tied to the curriculum, it would increase student motivation. Additionally, Gernstein noted that higher levels of discussion were yielded when videoconferencing was supported by inquiry-based activities. In the majority of these studies, however, major limitations can be noted; first and foremost, because the studies were conducted independently, sample sizes were either small or limited to a particular setting, provider or grade level. Consistent variables, which would allow for aggregation, also were not used across studies. In addition, in most cases, multiple methods of assessing impact were not used, nor were follow-up studies conducted to assess long-term outcomes. A similar lack of clarity can be found when examining early research on the impact of videoconferencing and support for educational reform.

As a result of this lack of information, one of the major objectives of Project VIEW, funded by the US Department of Education, has been

documentation of use and consumer impact. Project VIEW, a collaborative effort between schools and providers, led by NYIT and the Schenectady City School District, had as its goal the development of innovative ways of designing standards-based videoconferencing materials and training educators and providers to use the resulting videoconferences and supporting materials. Additionally, Project VIEW focused on the development of a sustainable infrastructure that would allow for future growth and



sharing. As part of this effort, approximately 100 videoconferences and supporting materials were developed, over 1200 teachers were trained in the process, and 183 schools and 75 providers were equipped with the

necessary hardware and software. As a result, through Project VIEW efforts, over 1600 documented videoconferences between providers and K-12 classrooms have occurred in the past 5 years reaching over 51,000 children. During this process, the Evaluation Consortium at the University at Albany/SUNY conducted a series of studies that investigated the impact of integrated videoconference-supported curriculum within K-12 settings. These included studies documenting facilitators of provider and school ability to support videoconferencing, the effective design of videoconferences, best practices in training teachers and providers in their use, effective methods of delivering videoconferences and integrating external content into classrooms, and ultimately, the impact of videoconferencing on educational reform and student learning (eg,

Newman, Barbanell, & Falco, 2005; Newman, 2005a; Newman, Gligora, King, & Guckemus, 2005; Newman & Guckemus, 2004).

The purpose of this report is to provide an overview of some of the findings of the impact of research on providers and/or schools specifically supported by the EEZ and/or NYIT. Findings from two key data sets are presented and discussed in light of other research pertaining to K-12 videoconferencing. Additional summaries of studies investigating videoconferencing are available upon request from the author, or online at <http://www.projectview.org/papersandpresentations.htm>.

Methodology

Study one: Perceptions of teachers who have participated in videoconferencing

The sample for this study consisted of teachers who had participated in NYIT-sponsored professional development as part of the federally-funded Project VIEW training. Paper-pencil surveys were mailed to 512 teachers who were involved in training from 2001 to 2004; a total of 141 responses were obtained yielding a 28% response rate. These respondents represented 29 school districts and over 100 school buildings. Seventy-five percent of the respondents indicated that their major educational role was that of a classroom teacher; the remainder were library media specialists and/or building technology staff. Approximately 14% had 5 or less years of experience in education; 33% had 6 to 10 years experience. Approximately two-thirds of the respondents were elementary (K-5) educators; the remainder represented primarily middle school (6-8) classrooms.

Constructs assessed by the survey included perceptions of training, frequency of and confidence in use of technology and videoconferencing, impact of videoconferencing on student learning, impact of videoconferencing on educational practices and the educational system, and barriers and facilitators to videoconferencing use. Data reported below include information from the constructs of impact on student learning and educational practices. For both constructs, participants were provided with a list of potential outcomes and asked to indicate, using a six point Likert-type scale, their agreement that each outcome was an impact that resulted from the use of videoconferencing. Responses were combined such that those who reported “Strongly Agree” and “Agree” were coded as in agreement with the

statement representing an area of impact. “Slightly Agree” through “Strongly Disagree” were coded as “no impact”. Overall reliability of both scales was greater than .60. Validity was evidenced through prior use in technology as reported in Newman 2004; 2005b; 2005c.

Study two: Perceptions of students who have participated in videoconferencing

The sample for this study consisted of students who had participated in NYIT- or EEZ-sponsored videoconferencing as part of their regular classroom instruction. As part of Project VIEW’s on-going impact evaluation, a series of classroom studies were conducted of direct use of videoconferencing. Selection of classrooms was based on teacher willingness to participate. Participants used for this data analysis consisted of 155 students, representing 7 classrooms in 4 schools. All teachers had been trained in videoconference use through NYIT, EEZ or Project VIEW workshops. Four providers are represented in the data; content areas included math/science, art, and history/social studies. Of the 155

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and software.*

responding students, 68% were in elementary settings (K-5) and 32% were in middle schools classrooms (6-8); 47% were male, 53% were female.

Five forms of instrumentation were used to collect data. First, where possible, evaluators observed the actual use of the videoconference as a means of independently documenting student, teacher, and provider interactions, delivery of content, and relevance to educational objectives. A standard observation form was used for this process. Second, after completion of the videoconference experience, students and the teacher were asked to complete paper-pencil questionnaires about the experience. The student questionnaire consisted of a series of four-point, Likert-type items addressing their perceptions of the topic, its relevance to their

classroom, and possible impacts in terms of interest and current and future learning. Students also were asked to self-report on their activities during the videoconferencing and the ways in which they worked with other students. The teacher instrument allowed self-reflection on relevance of the material, the ease of use, student activities, and barriers and facilitators to the process. In addition to these methods, where possible, the evaluators interviewed small samples of students and teachers after they had completed the paper-pencil instruments as a means of validating or developing respondent themes. Provider perceptions of the videoconferencing process were collected on an annual basis via parallel interviews and reflected overall views of the process, relationships with educators, and barriers and facilitators toward use. Data from these sources are triangulated as part of the information provided below. Reliability and validity for these sources are documented in Newman and Goodwin-Segal (2003) and Newman and Guckemus (2004).

Findings

Videoconferencing and student learning

Triangulated results of the studies indicate that use

of integrated, standards-based videoconferencing that was embedded within regular classroom use did have an impact on student learning. As noted in Table 1, when queried after multiple uses, the majority of teachers consistently indicated that videoconferencing assisted in instruction by supporting standards-based performance indicators. In addition, approximately half of all teachers agreed that it helped with performance-based assessment, noting that videoconferencing assisted students in preparing for assessments and, more importantly, improved student performance on these assessment measures. Interviews with teachers indicated that the most successful use of videoconferencing, in terms of support for standards-based learning, occurred when providers had clear indicators of which standards were addressed by particular programs, and when providers and teachers communicated before the videoconference on how the program was being used to supplement curriculum (see Table 1).

Similar findings were noted when teachers were queried about the ability of videoconferencing to support student outcomes related to inquiry-based learning. (See Table 2.) Over two-thirds of the teachers agreed that videoconferencing had resulted

Table 1
Support for Learning Standards and Standards-Based Assessment

Statement	% Agree
Videoconferencing supports standards-based performance indicators	75
Videoconferencing assists students in preparing for standardized assessments	47
Videoconferencing improves student performance on standardized assessments	45

Table 2
Support for Inquiry-Based Outcomes

Statement	% Agree
Videoconferencing supports direct instructional practices	80
Videoconferencing supports inquiry-based learning	85
Videoconferencing supports student generation of questions and analysis of solutions	80
Videoconferencing supports students in reflecting on their learning	71
Videoconferencing assists students in organizing information	65
Videoconferencing helps students analyze and solve problems more effectively	68

in higher levels of problem solving, high levels of discussion and questioning, and helped students reflect on multiple sources of information yielding more internal organization of data as well as a greater ability to analyze and solve problems. Observers noted that during videoconferencing students tended to ask higher levels of questions (based on Bloom's taxonomy) than during regular classroom discussions, and that when providers involved students in observation and reflection, students became more attentive and

engaged. This was particularly true in settings where the provider led students in conducting hands-on activities in the classroom during the videoconference. Interviewed teachers supported the importance of this involvement, noting that inquiry-based learning was now considered an important student outcome and that they wanted more videoconferences that would support this type of learning.

As a follow-up to these findings, teachers noted that the use of videoconferencing supported several underlying educational principles. At least two-thirds of all teachers who used videoconferencing noted that it helped students to transfer knowledge and to develop life-long learning skills such as self-direction and responsibility, aided in creating the underlying positive affect needed for continued learning, and helped meet individual needs of students. During interviews, teachers noted that videoconferencing was a mode of instruction that could be utilized by students of all ability levels and that, if possible, they would prefer to discuss their students' strengths and weakness with the provider ahead of the broadcast. Providers supported this desire, noting that they could and would adapt material to meet specific needs. Observations of repeated videoconferences by the researcher indicated that providers who were student centered were able to easily make these adaptations and perceived the benefit of doing so both for the student and for their organization.

Self-reported outcomes from students also supported the findings reported from teachers.

Students tended to ask higher level questions during videoconferencing than during regular classroom discussions. In addition, when providers involved students in observation and reflection, students were more attentive and engaged.

Almost all students reported positive outcomes from involvement both in terms of affect and learning. Most

noted that the program was interesting, made them more interested in learning about the topic as it was presented, and also made them interested in learning more. Similarly they reported that because of videoconferencing, the material was easier to understand, that they learned from the program, and that they would like to learn more. The majority of students also perceived the videoconference as

supporting instruction, noting that it fit into what their teacher was covering in the classroom. Observations by researchers noted that, when the latter finding was not supported by students, the purpose of the videoconference tended to more of a reward or "fun" experience, but that when teachers took the time to integrate the broadcast both before and after use, students were able to transfer the knowledge to onsite instruction.

The findings from these studies are further supported by a series of studies conducted by Newman and colleagues (2005), which investigated the impact of videoconferencing on student achievement via a series of ten quasi-experimental comparison group studies. In each of these studies, similar standards-based curriculum was provided to two groups of students; one group of students received part of the material via videoconferencing while the other group received parallel material via the teacher. All students in each study received the same teacher-developed assessment at the end of the unit. Results indicated that in 9 of the 10 studies, students who received the videoconferencing material as part of instruction had greater interest and retention, and tended to receive higher scores on the assessment measure than did students who received the traditional "onsite only" material. In the study where non-videoconferencing yielded higher assessment outcomes than videoconferencing, the teacher and provider experienced technical breakdowns that detracted from the presentation.

Table 3
Student Activities During Videoconferencing that Support Reform Movements:
Guided Inquiry and Constructivist Learning

Activity	Presenter Guided	Presenter Teacher Guided	Student Centered	% Agree
Watching the Program	***	***	***	92
Answering Questions	**	*	***	59
Asking Questions	**	***	***	59
Participating in an activity with the presenter(s)		***		61
Discussing the topic with others	*	*	***	40
Participating in an activity with my teacher(s)		**	**	32
Working in a group	*		***	27
Solving a problem with the presenter			**	30
Working independently				25
Talking with my friends	*		**	15
Taking notes			**	32
Designing or making something			***	3
Solving a problem with my teacher				22
Writing about the topic				19
Doing things not related to the program				4
Working on an experiment				7
Working on other homework				9

*** Activity almost always present; ** Activity generally present; * Activity sometimes present

Videoconferencing and educational practices

A major concern of educational administrators and teachers who have been practicing for multiple years is the ability of a new initiative to support mandated reform movements. All programming, but especially new approaches, require a shift in resources and that shift must be weighed against external demands and availability. As a result, a second focus of our research was to determine if the use of external expert provider videoconferencing was perceived as benefiting schools' need to meet selected educational reform initiatives, and if so, what kinds of videoconferencing would best facilitate this need.

Four major reform efforts were studied as part of data collection: inquiry-based learning, alignment of curriculum and instruction with standards-based learning, an expanded use of divergent resources, and the improvement of student achievement. The findings reported by teachers who had used videoconferencing parallel those found across the larger population of teachers and administrators who were involved in Project VIEW's initiative (Newman, 2004; 2005; 2005a). Data indicate that teachers perceive the use of videoconferencing to support major initiatives, especially the use of expanded resources. Of note are teachers' perceptions pertaining to videoconferencing's support of two *NCLB* initiatives: improved student achievement and inquiry-based learning. When queried as to why they perceived this support, over half of the teachers noted the presence of specific outcomes related to student learning, and the majority noted videoconferencing's impact on changing curriculum and instructional design. These findings were supported by interviews with teachers who noted that, as a result of training in videoconferencing and its subsequent use, they had redesigned specific curriculum units to include

more resources, differentiated instruction and hands-on and problem-solving activities.

Data collected from NYIT-supported sites were analyzed in a manner similar to that presented by Newman and Goodwin-Segal (2003). Findings support a growing number of student-centered videoconferences and the use of key activities that support this process. Approximately 60% of the students reported that they were involved in programs that would assist in building advanced problem solving skills, reflective thinking and improved questioning.

Implications for future use

The findings from these studies reflect the overall evidence of positive impact of the use of videoconferencing in K-12 classrooms found as part of the Project VIEW research agenda. When standards-based videoconferencing and supporting materials are integrated into curriculum and instructional practices, both teaching and learning are improved. Teachers have more access to external resources, they have a “co-teacher” who can help them work with students, and they are able to offer more opportunities for higher level thinking as evidenced by advanced problem solving, higher levels of questioning, more in-depth hands-on work, and greater retention over time and on teacher-developed assessment. Teachers perceive that this leads to greater support for educational reforms, especially *NCLB* requirements and mandated testing. In addition, they report changes in their overall design and implementation of curriculum as well as expectations of students. These findings are complemented by student self-reports of outcomes pertaining to instruction, especially those related to motivation, interest, and learning. Findings also included requests for and use of a growing number of student-centered videoconferences which reflected inquiry-based learning and student-centered approaches to knowledge transfer. Overall, results indicate that videoconferencing among external providers and students in K-12 educational settings is productive in terms of student learning and should be encouraged and supported by educators and providers (Newman, Gligora, King, & Guckemus, 2005).

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Table 4

**Student Involvement in Reform Movements:
Collaborative and Cooperative Learning**

Type of Interaction	% Participation
Worked alone	40
Worked with my teacher	47
Worked with a partner	23
Worked with a small group	31
Worked with my whole class	43

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Pieter de Hooch (Dutch, 1629 - 1684). *Portrait of a Family Making Music*, 1663. Oil on canvas: 98.7 x 116.7 cm. © The Cleveland Museum of Art, Gift of the Hanna Fund 1951.355

International Peace Videoconference

In September 2005, over 700 students in Boston, MA; Long Beach, NY; Cairo, Egypt; and Islamabad, Pakistan participated in an interactive videoconference designed to promote world peace and understanding. During the 90-minute connection, students from these countries spoke about their daily lives, cultures and customs. In addition to the four interactive sites, thousands of students at sites around the world watched the conference over the Internet.

The videoconference was coordinated by Empower Peace and supported by NYIT's Technology Based Learning Systems (TBLS). Empower Peace is a non-profit organization committed to promoting respect and understanding between youth in the United States and youth in the Arab and Muslim world. During the event, student "ambassadors" at each interactive site made brief presentations and asked and answered questions on various topics, including music, sports and fashion. Reading from the Long Beach High School's Pledge for Peace, senior Carolyn Gomez said her school would work "to break the cycle of violence,



Connections like the Empower Peace event "bring out the humanity in our students," said Mike Richez.

intolerance, ignorance and discrimination." The event also included musical performances from Cairo and Islamabad, as well as a taped message from Pakistani President, Pervez Musharaff.



According to Mike Richez, Director of Technology and Information Services for Long Beach Public Schools, the human connection among the students was amazing. "In terms of technology, our students tend to have everything available to them; they aren't easily impressed. In addition, there is a concern that technology will dehumanize us. But the Empower Peace event demonstrated that a technology like videoconferencing is very exciting and actually brings out the humanity in our students." As a result of that human connection, Long Beach and Boston students were anxious to help their new Pakistani friends when a devastating earthquake struck the country just days after the videoconference. In November, Mr. Richez and two students traveled to Boston to participate in a live TV/Internet telethon organized by Empower Peace. *The Peace, Pledging for Pakistan* telethon raised \$10,000, and Long Beach High School students collected an additional \$500.

At the September videoconference, Stan Silverman, director of TBLS, stressed, "It is our responsibility to support the students of the world through the development and application of technology." He commended the participating students for their spirit. "The hope of our world depends on you and your use of these technologies," he told them. ■

Videoconferencing? Why We Do It

An experienced provider and receiver share their reasons

A Provider's Point of View

By Gunter Grossmann, Coordinator, and Bruce Spivak, Chef Instructor, Culinary Arts Center, New York Institute of Technology

Why videoconference? It provides a unique learning experience, a change of pace from traditional classroom instruction. Generally speaking, students don't like to think outside their comfort zone, but videoconferencing forces them to take a fresh look. When an expert connects and shares his or her point of view, a dialog opens. It's re-invigorating and re-engaging for the students, regardless of their age. Talking to a television is still a novel experience and, consequently, a great motivator for learning.



Culinary Arts Center lessons are like a television show with lots of interaction and no commercials.

Videoconferencing takes students outside of their classroom, across the country and across the globe. It offers exciting, educational opportunities that wouldn't be feasible otherwise. After all, how often would youngsters in rural areas, or even in urban ones, actually meet and talk with a professional sous or pastry chef? We've connected with schools that have only two cooking burners. As professional chefs

with professional equipment, we can take cooking instruction beyond the capabilities of most school culinary programs. Our lessons are like a television cooking show without commercials and with lots of interaction. In addition, we can go beyond the cooking show format by using the culinary arts as a springboard for lessons in history, culture, science and math.

The key to successful connections is being organized and flexible. In our experience, everything done in a traditional cooking class can be done virtually. Whatever we're doing on camera in our kitchen, the students can do in their classrooms, but adjustments may be necessary. For example, completing a food preparation may actually take longer than the average 50-minute videoconference connection. In addition, the presenter needs to discuss the lesson with the teacher prior to the event, so they can tailor programs to student needs as well as to the teacher's curriculum goals and objectives.

We've found that pacing is also important to the success of the videoconference. We don't have the physical presence in a videoconference. Even a fun topic doesn't guarantee student engagement. Sometimes students, particularly older ones, are uncomfortable or resistant to the medium at first. Pacing helps us grab and hold the students' attention. We create excitement and then we build on it.

Besides being a great instructional tool, videoconferencing is a wonderful promotional tool. Each video "visit" spreads the word about the culinary arts and our center. Each connection leads to new connections, and if a few students enroll in the Culinary Arts Center because they've participated in a videoconference, we couldn't be happier. Here at the Culinary Arts Center, we're expanding our programs to stay current (continued on p. 32)

A Receiver's Point of View

By Maria Fico, Instructional Technology Specialist, Region One, Bronx, NY

When asked, "Why use videoconferencing?" I find it harder to validate why classrooms would want to be without this rich resource. As educators, we spend most of our professional careers looking for that one stroke of teaching genius that will change a child's life forever. It's all about that moment of "a-ha," when everything clicks into place. Looking back, long after our retirement, we want to be able to say, "I know I have made a difference."

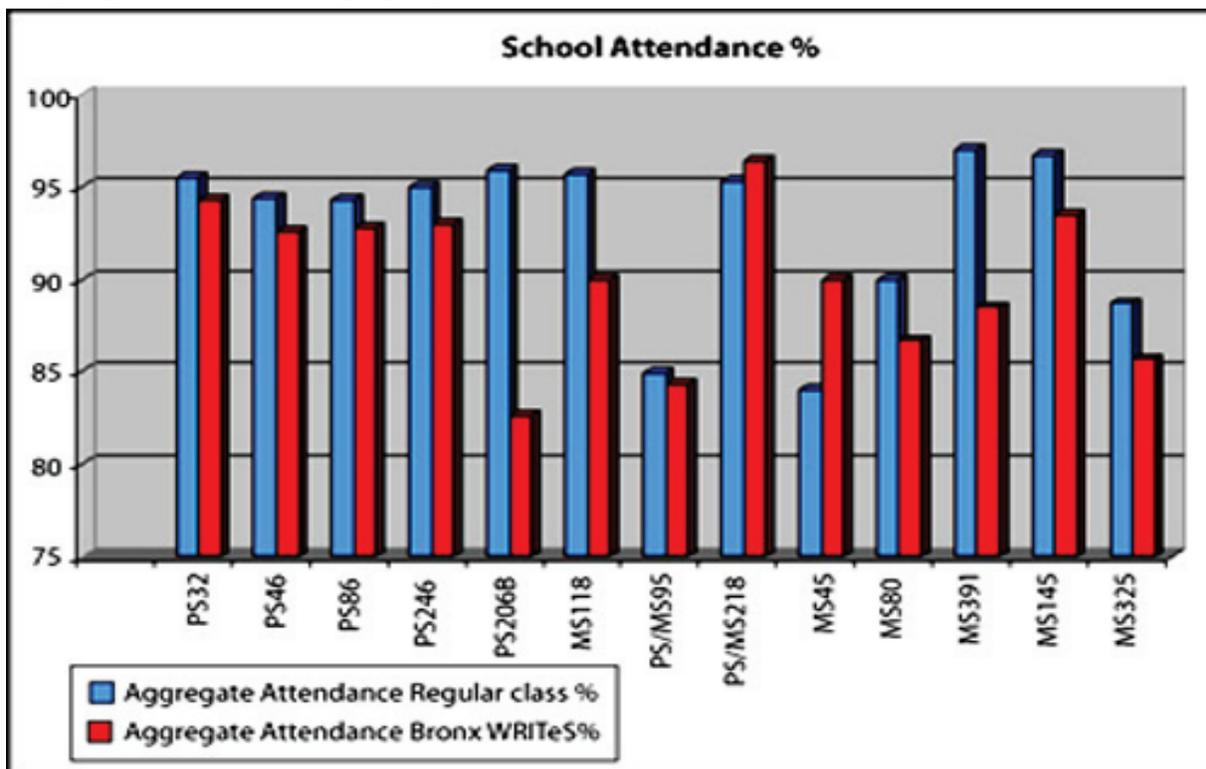
Over the past nine years, I have heard many anecdotes about sparks in the eyes of children when they suddenly find themselves in front of the videoconference camera talking, for instance, to a real astronaut or historian. These are children who used to hide in the classroom in an attempt to blend in with the furniture, but now have suddenly found their voices. Middle school students freely tell how they feel about war, politics, terrorism and the stress of daily life in an inner city.

Then there's Vincent, a sixth grader, who so eloquently explains how being in front of a camera when he recites poetry is so much more exhilarating. "When you perform in front of people you tend to

look at only the front row of the audience and pick up on the feedback that just a few people can give you through their body language. When you share your work from a different location, through a videoconference, you are able to focus more on your entire audience, see the room from a much wider perspective and receive feedback about your work from everyone."

We can no longer teach today's students using only yesterday's tools and approaches. *The Net Generation*, explains Donald Tabscott, refers to the generation of children who, in 2005, are between the ages of eight and twenty-eight. They can be found in all of our elementary, middle, high school and college classrooms. They are fluent in digital media because they grew up using video games and other technologies every day for play, communication, shopping and learning. According to Tabscott, "When we turn them loose in today's traditional classroom it is not surprising that they become underachievers that are potentially doomed to failure" (1998).

For constructivist learning to occur, students must actively construct meaningful mental representation from presented information (Mayer 1999). Videoconferencing as a tool naturally provides this type of learning through real-time interaction with an authentic audience that can provide immediate



Three-year data for students on the same grade level in classes with (Bronx WRITeS) and without (Regular Class) videoconferencing

feedback. The teacher is no longer the only source of knowledge. The videoconference enables the teacher to collaborate with an outside expert, preserving the teacher's role as leader without requiring him or her to be expert in all subject matter. The role of facilitator of learning becomes more acceptable to the teacher who is able to integrate a videoconference session by using both pre-conference and post-conference activities that complete the study of a topic.

Although research on the impact of this technology is limited, it suggests that using videoconferencing for teaching and learning has many benefits for today's digital natives. In facilitating Level 2 reading comprehension, for example, research shows that "the use of sound, pictures, and animation pictures or video in addition to text have played an important role in vocabulary acquisition and in overall text comprehension, and are unquestioned components of instructional materials for language learning" (Chun, Plass, 1997). Videoconferencing provides interactive audio and video plus the ability to share other media through the use of document cameras, VHS and DVD, web-based applications and other computer-based tools. It's the ultimate interactive learning experience for any student's learning style.

Through classroom observations, surveys and data collection in Region One over the past nine years, we have documented the following student learning outcomes found in classrooms that were engaged in videoconferencing on a regular basis:

- Improved student attendance
- Increased motivation for learning
- Increased retention
- Improved writing quality
- Enhanced communication & social skills that carry over to other subject areas
- Increased self-esteem and self-awareness

Data on student attendance collected over the past three years have shown increases in student attendance in classrooms that used videoconferencing for the Bronx WRITeS (Writers and Readers Incorporating Technology in Schools) poetry slam project compared with classrooms that didn't participate in the project. In addition, significantly more students in the classrooms participating in the project scored at or above grade level on NYS standardized ELA exams as opposed to non-participating students in similar classes on the same grade level. For example, at PS 32, the percentage of participating Level 3 students who met or exceeded the NYS ELA Standards was

higher than the percentage of non-participating Level 3 students in 2001-2002 (63% vs. 16%, respectively), in 2002-03 (73% vs. 13%, respectively) and in 2003-04 (77% vs. 22%, respectively). Benefits were also found among middle school students. Specifically, at Level 3, the percentage of Bronx WRITeS students who met or exceeded the standards was higher than the percentage of non-participating students at MS 80 in 2002-2003 (41% vs. 10%, respectively) and at MS 391 in 2003-2004 (45% vs. 0%, respectively).

In Region One, we videoconference because it expands the walls of the classroom. It allows both teachers and students to discover new resources of knowledge and to collaborate with learners all over the world just by making a call. When a class of students in South Dakota completes their lesson in New York, the learning becomes a richer, more powerful endeavor that motivates students not to miss school and empowers them for greater achievement. That's why we videoconference.

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with this evolving technology. Specifically, we intend to create new lessons that will address state educational standards and assessment needs. In the near future, we hope to have a dedicated distance learning instructor and a larger cooking lab. And finally, we plan to create video-on-demand clips on topics such as "how to sauté" or "different methods for chicken preparation."

The Culinary Arts Center has always embraced technology and appreciates the opportunity to connect with distant schools. As our website says, "Bring us into your kitchen...step into ours." Videoconferencing enables such visits in a very real way! ■

Do You Know the Way to a Good Videoconference?

Finding programs is easier when you recognize the “signposts”

By Linda C. Unger

At the time the Educational Enterprise Zone® was founded, there weren't more than a dozen content providers offering videoconferencing lessons for schools, and the number of schools with access to this technology was similarly small. Today, there are hundreds of programs available from nearly 200 content providers. What a tribute to the impact and appeal of this technology! However, it presents a challenge for receivers who must travel through the “sprawl” of providers and programs to get to really good videoconferences. To help you find good programs, we asked EEZ receivers to tell us the important “signposts” and how to read them.

Program quest

While cost may be a driving force when deciding which videoconference (VC) programs to book, there are several much more critical factors that schools should consider as well. Remember: The goal of videoconferencing is not to entertain, but rather to use both funding and class time effectively to facilitate learning and support standards-based achievement. Consequently, it's important to ask:

- Does the program address state or national learning standards?
- Is the program grade appropriate and matched to your local and state curricular frameworks?
- Does the program represent an appropriate use of the technology?

Learning standards

Utilizing learning media or materials that don't align to state or national learning standards is simply an unacceptable strategy for teachers in the 21st century. Everything we as educators hope to achieve with students is now based on benchmarks that define proficiency and performance, both in terms of knowledge and thinking skills. This means the learning standards need to be at the heart of the videoconference selection process.

How does one determine whether a particular VC lesson aligns to standards? Generally, content providers are well aware of the importance of standards and, consequently, will claim their programs are “standard-based” in marketing materials. But you'll have to dig deeper to be certain. Search the provider's materials and website for a correlation to either a state or national standards document that also references specific performance indicators. Often, information this detailed can only be found in the teacher materials that accompany the videoconference. Some content providers make these program accompaniments available from their website. If you don't find it there, contact the provider and ask to see the alignment.

Another, quicker way to find out if a program is standards-aligned is to use an online videoconference program catalog. You can find a list of these catalogs on The Southeastern Wisconsin Instructional Network Group website (<http://www.swing.k12.wi.us/>). Since each of these online catalogs works a bit differently, it's a good idea to get familiar with them. Programs are searchable by various criteria, such as grade level, topic, and/or key word.

Some catalogs will give standards information, while others will link you to content provider sites. The EEZ Videoconference Database catalog (<http://www.nyiteez.org/Videoconferencing/>) is especially useful for New Yorkers because they can identify a specific learning standard and search for programs that match it. The programs listed in the database come from content providers all over the country and many have been rated by teachers who have seen them. (See *Searching the EEZ Videoconferencing Database* on p. 72.)

Keep in mind that with nearly 50 state learning-standards documents out there, a content provider may only have the resources to align a program to one document. Since their audiences can be anywhere, many content providers will select a national document. When you find and read the national standards indicated for the VC lesson, just look for similar standards in your own local standards document.

Grade & curricular matches

Online catalogs and provider websites always indicate the targeted grade levels for VC programs, making it an easy “signpost” to find. What’s not so easy to determine is how accurate the grade and curriculum match actually is. Many school-based VC coordinators report that lessons aren’t always taught at the advertised grade level or that lessons aren’t actually appropriate for the advertised grade level. In addition, program descriptions may be too vague to tell whether the content will complement the curriculum. A videoconference is supposed to integrate into existing curriculum as either an introductory, continuing, or culminating experience. With only a brief description, it’s hard to know where the program will fit best. Teachers also want to be assured that the program will be a more in-depth experience than can be accomplished using traditional classroom resources.

If the accompanying teacher guide for the VC lesson is available in advance, take a look at the learning objectives. They can help to determine whether the program is grade appropriate and a good curricular match. But if all you’ve got is the program description to go by, experienced VC coordinators offer this advice: If it sounds like an overview, the program itself probably will only scratch the topic’s surface. That will be an unsatisfactory experience for all grade levels. If you’re still not sure the program will meet your instructional needs, contact the provider.

Many are willing to work with you by customizing a program to fit your particular situation.

Valid use of the technology

An often overlooked criterion is whether a particular topic is worth addressing via a videoconference in the first place. Are the materials going to be presented in the same way they would if the lesson was done in a traditional classroom with existing media and resources? Or is there something unique here that the students could never experience without a videoconference? For example, if you have no zoo within field trip distance of your school,

Remember:
The goal of videoconferencing is not to entertain, but rather to facilitate learning and support standards-based achievement.

a videoconference with a zoo is a valid use of the technology. Additionally, having your students interview their Congress person or Representative, discuss environmental issues with a marine biologist from another state, or explore the writing process with an accomplished author are all valuable videoconference experiences. But if a VC lesson presents the basics of “how a bill becomes a law,” don’t waste your time or money.

The rule of thumb used by Mary Ann Cowan, middle school social studies teacher and VC Coordinator at Saints Cyril and Methodius School, Deer Park, NY, cuts right to the chase. The parochial school on Long Island is on a smaller VC budget than most schools, so every booking choice is critical. Cowan asks, “What will this videoconference bring to my students that I couldn’t do? If I can do this lesson myself, I can do it better and cheaper.”

Asking directions

Knowing the important “signposts” and how to read them will certainly help you as you cruise through the various online program resources. The more comprehensive the information offered by directories and content providers is, the easier the task will be. But until you actually see a program you’re considering, you won’t know whether the presenter is a dynamic teacher or if the presentation meets its

intended objectives. One solution is to ask around.

Contact experienced VC users from other schools, the EEZ, or other distance learning consortia to ask about a provider and/or program you're interested in. Hunt for online program reviews and ratings. When anyone at your school does a program for the first time, be sure to record both teacher and student reactions to the lesson. Develop an evaluation form for teachers and students to complete, which can be kept filed for future reference. Or, at the very least, engage students in a debriefing session while the VC experience is still fresh in their memories. You can share their impressions with other teachers in your school.

Some VC coordinators report that they never book a program they haven't seen personally. Besides observing programs booked for classes in their own schools, they attend distance learning conferences and professional development workshops that feature mini-programs or "demos" from content providers. Some content providers are also willing to conduct demo programs for your faculty meeting, or let you dial in and observe a conference they're doing for another school.

As a last resort, you can post a message on a distance learning bulletin board or listserv to get "word of mouth" information from far away. One caution here, though. If you're asking about a specific lesson or content provider in an Internet forum, observe certain courtesies for the benefit of the content provider. For example, it's all right to post a message such as, "I'm looking for a museum program on visual literacy. If you have recommendations please email me." A message such as this puts you

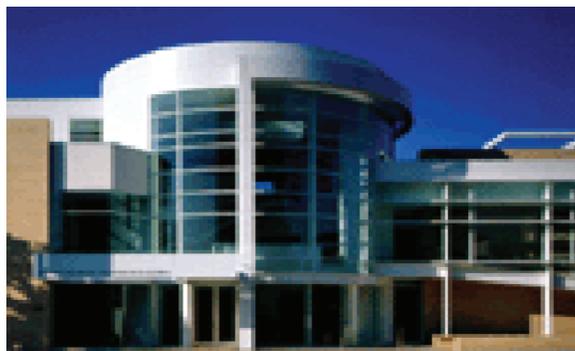
in touch with other receivers without embarrassing anyone by having someone reply to your query publicly and criticizing a particular museum whose program may have been less than stellar. Remember also, that a substandard program isn't always the fault of the content provider. Sometimes the students and teacher are totally unprepared for the session, or the technology itself is plagued by the "poltergeist" on a given day. So it's best to seek online advice by corresponding privately via email or phone and asking a few questions.

Similarly, if you've received a great program, let other folks know about it. Post a message to the listserv you belong to. Something like the following is both helpful and kind: "My 7th graders just had a videoconference from the —Science Center on space travel and the presenter was awesome. My students were mesmerized and the accompanying materials were excellent. We highly recommend this program."

While it may seem that there's too much to consider, teachers who clearly understand their state learning standards and who focus on learning objectives rather than entertainment value shouldn't have too much trouble finding pedagogically sound videoconferences. There are oodles of them out there, especially from our own EEZ content providers. Happy trails!

Acknowledgements

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Grant Mudford

Providers such as the Museum of Television and Radio, CA, work with schools to ensure instructional needs are met during the videoconference.

To MCU or Not To MCU? That is the Question!

Before answering, learn what a Multiple Conference Unit can do

By Stan Silverman

One of the problems in the utilization of new technology is that we sometimes try to force its applications. We always need to make sure that whatever technology we deploy, we do so only because it enhances the teaching and learning environment. One technology that has precipitated strong beliefs on both sides of the “use or not-to-use” discussion is the Multiple Conference Unit (MCU). Before we can weigh in on this debate, we must first look at what an MCU actually is and what capabilities it has for videoconferencing.

Ports galore

An MCU is essentially software or hardware that allows multiple individual videoconferencing sites to be connected to each other. MCUs come in a range of sizes and can connect from two sites (for point-to-point bridging) up to hundreds of sites in a single call. The system provides for simultaneous audio from each site with the video being displayed either in a voice-activated mode in which the current speaker is displayed or in a “Hollywood Squares” mode in which the screen is segmented into separate video windows with views of each site. Some systems provide the ability to show all participant sites as well as zoom in on the screen of the current speaker. Generally, the provider of the MCU will allow the participants to select which mode is best suited for their videoconference. Many MCUs also have bridging capabilities that enable ISDN- and IP-based videoconferences to connect to each other. Due to the nature of the technology and the laws of physics, connections through the MCU can

increase the latency in the connections (the delay) and slightly reduce the video quality.

NYIT’s EEZ has two large MCUs with a total of 32 ports. Those ports can be divided to accommodate any combination of sites. The bridging service allows both content providers and schools to use whatever type of videoconferencing equipment they currently have. Content providers or schools wishing to use the MCU must schedule a specific date and time for their sessions. While the EEZ provides this capability free for incoming calls, many MCU providers charge per site and per hour for this capability. The costs can add up quickly when you use a commercial bridge service.

Multi-tasking

When MCUs were first made available the immediate application that came to mind was sharing a single content provider with multiple schools. This application allows the content provider to service a larger number of students and at times to reduce the cost to the individual schools. In fact, one of the most frequent uses of the EEZ’s MCU is to allow a single provider to connect to two or more schools at the same time. In addition to delivering a videoconference lesson to multiple sites, the MCU has been used by many providers when they have a special presenter who is not available on a regular basis. The Holocaust Memorial and Tolerance Center of Nassau County, for example, has used the EEZ’s MCU to connect multiple schools with a Holocaust survivor making a rare visit to the site.

Providers aren’t the only ones who have benefited from delivering (continued on p. 38)

What EEZ Members are Saying About... Multipoint Videoconferences

<p>Gene Carlucci Museum Educator Intrepid Sea Air and Space Museum</p>	<p>“Our programs are designed for one class connections. If smaller class size has a positive impact on learning, and research clearly shows that it does, aren’t we sacrificing something if we simultaneously connect two or three classes of more than 25 students each? We can’t imagine too many classroom teachers who’d be excited about teaching a room of 75 students, yet some schools expect distance learning educators to do so.”</p>
<p>Linda Meltzner Computer Technologist Woodward Parkway School Farmingdale, NY</p>	<p>“We’ve done several multipoint videoconferences and they’ve all worked out very well. We’ve saved some money, too. The students enjoyed knowing that there were other schools interacting during the conference. Last year, prior to the presidential election, we did a multipoint connection with a provider and several classes on how media influence the election.”</p>
<p>Candace LeClaire DL Coordinator Philadelphia Museum of Art</p>	<p>“We have done multipoints in the past and run into a whole host of problems. For example, the classroom teachers had prepped their students differently, and the classes were on different levels. This made it difficult for us to teach effectively to each group. The other downside is the limited interaction with each class.”</p>
<p>Mary Ann Cowan Teacher/VC Coordinator Saints Cyril and Methodius School Deer Park, NY</p>	<p>“Student interaction is somewhat limited in a multipoint and we’ve experienced technical glitches with the bridges. However, multipoint connections enable students to witness the responses of students from other schools and that has had a big impact on my pupils.”</p>
<p>Tommy Bearden DL Coordinator Region 14 ESC Abilene, TX</p>	<p>“Distance learning is challenging our way of thinking. As providers of content, we can no longer require students and teachers to assemble before us so we can bestow our knowledge upon them. Instead, we must find ways to assemble before them. The obvious way is the multipoint. Granted, point-to-point is easier and less technologically complicated. But for collaborative DL projects, I prefer multipoints. Why go through all the work to design a project and share it only between two endpoints?”</p>

Continued from page 36...

content over MCU technology. A wonderful application has been the Bronx WRITeS poetry slam project conducted in NYC's Region One in the Bronx. In this design, students are able to compete with other students outside their building and to have their work evaluated by remote judges. This type of activity creates the culture of all classrooms being sources of content, not simply the recipients of the content. (View excerpts from past Bronx WRITeS at: <http://216.73.0.52/> and search for Bronx WRITeS.)

However, while creating a more efficient delivery system, the MCU also creates a series of instructional challenges. Connecting to a class of 30 students is difficult by itself, but connecting four classes, each having 20 or more students as well as having different levels of readiness and preparation, is in order of magnitude more difficult. These types of connections require a different instructional approach and may significantly impact the content or concepts, which are the main focus of the connection. For schools

and content providers to achieve their desired outcomes, it is necessary to change the paradigm used. For example, the instructional design for videoconference lessons often includes time for the students to interact among the sites. For this time to be effective in a multipoint connection, it's imperative that the pre-videoconference materials prepare students for the actual connection's interaction.

As with any technology, the MCU is neither good nor bad; it is the instructional design that makes it work or not work. There will be times when the use is appropriate and will enhance the teaching and learning, and there will be times when it will distract from the intended outcomes of the connection. Each type of connection needs to be reviewed to determine whether the use of the MCU for multipoint connections is appropriate.

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The EEZ would like to thank Linda C. Unger for compiling the quotations from our members. ■

Teachers On Board



How to encourage teachers to collaborate

With few exceptions, the class-to-class collaboration is free, which makes it an attractive videoconference application and one that tech coordinators like to encourage. Generally speaking, students are eager to collaborate with students at distant schools; they love the medium. But tech coordinators report that teachers can be resistant. Perhaps, the best way to demonstrate the instructional benefits of collaborations or any type of videoconference is to give teachers a "taste" of the interaction.

For example, a video clip of a class collaboration that has already happened in the school district is probably the simplest way and, depending on the clip, can be very effective. If the professional development occurs during the school day, it may be possible to arrange a connection with a provider who does multipoint connections. The teachers may be able to *view only* a connection with two or more interactive classes and the provider. This isn't a class-to-class collaboration in the strictest sense, but it gives teachers a taste of the excitement when students from distant sites learn together. If these two methods aren't an option, try arranging a connection with a receiver who has been active in class collaborations. Most likely, the receiver will have a couple of video clips of class-to-class connections to share.

After the teachers have seen an example of a class-to-class collaboration, the tech coordinator can build on that by giving additional ideas for exciting collaborative lessons. If you haven't had a lot of experience with this, try the web. Many states have websites heralding their experiences, including anecdotes, "how-to's," and even leads for finding a distant class. (For more information, see *A Checklist for Class Collaborations* on p. 58) ■

IP Movement

The communication that carries videoconferences is changing

By Stan Silverman

When some of us clean out our basements, we find a symbol of technological change—the vinyl record. Now used rarely, it was once the only way to bring recorded music to the home. There are still audiophiles who use vinyl records instead of CD's or iPods because they feel that the sound quality is better.

In many ways, the world of communication that carries our videoconferences is facing the same type of change. In order to make informed decisions, it's important that we understand this change and its potential impact.

ISDN calling

In much the same way the vinyl record opened homes to an electronic resource (audio) the communication technology called ISDN opened up the world of videoconferencing. Integrated Service Data Networks (ISDN) freed us from very expensive private networks costing thousands of dollars per month to a service built on the phone network, which is available in many locations for a relatively low monthly fee plus a charge for time online. The key advantage of ISDN is its predictable level of service or QOS (Quality of Service) when establishing a connection. It is like getting on a highway and knowing that you will be able to travel in a special driving lane at 65 miles per hour without encountering any traffic, bad weather or breaking any laws. You are also able to decide what speed you need for your videoconference and can pay for the amount that you need for each videoconference.

The downside is the cost per call and relatively limited availability of the ISDN service. Most videoconferencing occurs at speeds between 128K and 512K. Generally you pay for speed in intervals of 128 kilobytes per second. The prices

vary for each 128 “block” but generally are within the range of twice the cost of a non-discounted business phone call. Typical domestic calls can cost \$1.00 per minute for a 128K call and \$3.00 per minute for a 384K call. International ISDN calls can be many times that amount. These costs (often exceeding the cost of the program) not only represent a problem in real dollar expenditures but also represent a problem for the school's administrators because they cannot predict ahead of time the total costs of connectivity.

Access to ISDN service is based on whether or not your local phone company has the capability and your distance from the phone company. If you are too far from the phone company, you will not be able to use ISDN services. In short, the users must balance the predictability of the connection versus the cost and availability of the service.

IP world

What has really opened up the world of videoconferencing is the ability to connect locations together utilizing the Internet. This type of videoconferencing is called IP (Internet Protocol). This technology allows videoconferencing participants to connect to each other over the commercial Internet or over Internet2 connections. In 2002, 99% of schools nationally were connected to the Internet (Kleiner and Farris, 2002) and in 2003, 95% were connected via a broadband connection (National Center for Education Statistics). These numbers, while somewhat misleading because of the definition of broadband used in the surveys, suggest that we shortly will be able to reach virtually every school with videoconference connections, and that they will not incur any additional costs beyond the costs for Internet service.

If we consider the EEZ tenet of equity and

the importance of cost, low-cost IP seems a logical selection. However, we also need to zoom out a bit and look at some of the issues that come as a result of using the Internet to see if they have an impact in delivering programs to schools.

The first factor is Quality of Service, which is one of the features that ISDN provides. Does IP video provide the same level of QOS? The answer to that question is “sometimes.” To understand the answer, we have to go back to our highway example. In the case of IP connections we no longer have a private highway. We share that highway with many users and these users can often create heavy congestion on the road and can have accidents that can cause delays. I once scheduled an IP-based videoconference in the evening to try to reduce the chance of congestion on the Internet only to find that I had scheduled the connection at the same time Victoria’s Secret was having an online fashion show. The impact that the congestion caused was periodic dropping of the connection and slow connection speeds, which resulted in poor motion video. In fact, a number of times during the connection the video looked like the early days of movies.

A second factor that we need to look at beyond cost is school safety. Safety concerns have led to schools putting up firewalls on their Internet connections. These firewalls protect the schools from outside attacks, but they do not automatically distinguish between friend and foe.

In order for video to move in and out of schools, the schools need to open holes in the walls they have built to protect themselves. This issue should be relatively easy to deal with in schools with technology support, but may be problematic in schools with limited or no support. Some schools have dealt with this by putting in separate networks for videoconference devices, which are, stand-alone appliances.

A third factor in the decision process relates to the quality of the audio and the video. This again relates to the issue of traffic. When using ISDN, you can predict what the image quality will be. With an IP connection, the amount of traffic will influence the motion quality of the image. If you have a high-speed connection with little traffic using the Internet you will have excellent video/audio quality. But if there is traffic, you can experience a loss of perceived quality.

Compatibility

Another issue we need to deal with as we make the selection of IP vs. ISDN is the lack of compatibility between the two communications systems. You cannot simply connect an IP video call to an ISDN call. The calls must go through a process called transcoding. Transcoding is available through many Multiple Conference Units (MCUs) with built-in bridge software. These devices will allow the two different calls to communicate, but add a whole level of complication to the scheduling of the events

IP	ISDN
The effective bandwidth is subject to amount of Internet traffic	The effective bandwidth is guaranteed
Freezing and dropped calls are possible	Consistently high-quality transmissions with fewer dropped calls
Firewall troubleshooting required	No firewall issues
Inexpensive	Expensive
Equitable geographical access	Limited geographical access
Can support emerging High Definition transmissions with existing connections	Would be cost prohibitive

and may have a financial impact as well. The EEZ provides this service for free, but many providers and schools use commercial services and have to pay for that service. The costs could be equal to the cost of the programming.

What is a provider or school to do? The best solution would seem to be to have both available. That is like our audiophile maintaining a record collection, a CD collection and an MP3 collection. If it is affordable to your organization, it is an excellent option. The reality, though, is that most units being sold into schools are IP-based. This is due to the lower (free) cost of making the connections with these units as well as the fact that IP units are generally cheaper to purchase. Sure there are compromises which will have to be made (at least on the commercial Internet), but the gains are significant. Instead of connections being used infrequently because there is a cap on available dollars for communications, connections can be made more frequently. In addition, the IP world, which includes vast numbers of schools and libraries, invites many new opportunities for school-to-school and schools-to-libraries connections within and beyond our communities.

Newer digital technologies

Just as most music fans have put away their records for special occasions and adopted CDs and iPods, videoconference users may need to think about putting away their ISDN-based equipment and use the newer digital technologies that are available. Times are changing and it is critical that we understand the changes and their potential impacts. The lead factor in the change will be centered on the availability of Internet2 (I2) and the development of better compression techniques for video. The rapidly expanding use of I2 is addressing QOS issues. One EEZ member, Monroe #1 BOCES, is already deploying I2 to their eleven component school districts. These districts now can take advantage of the higher speeds and the ability to prioritize video when making connections. At the moment this comes with a high price tag, but this will hopefully decline as more states and consortiums begin to develop I2-based networks.

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What Receivers are saying about IP...

“The number one consideration is bandwidth. The general level of web traffic that may interrupt a lesson is also an important issue.”

— Dale Hilton, Associate Director, Education and Public Programs, Distance Learning, CMA

“By using the bridge, we were able to connect with IP sites through our ISDN lines instead of through the zoo’s overloaded IP network.”

— Erin Fitzgerald, DL Instructor, Bronx Zoo

What Are We Looking For?



EEZ members offer the best practices in communication

By Rose Tirotta

When you ask someone what makes a “good” videoconference experience, it is sometimes difficult to get a definitive answer. Even if you have been “in the game” for a while, verbalizing what should be done and, conversely, what should be avoided can be a formidable task. Over the past year, we gathered suggestions from participants at EEZ meetings and EEZ University workshops. The one idea that kept resonating in everyone’s responses was “communication.” Clear communications between the provider and receiver throughout the videoconference experience—that is, before, during and even after the connection—is the single best way to ensure success. What follows are provider suggestions for receivers and receiver suggestions for providers on the best practices in communication.

What receivers want providers to do

In their search for programs that will benefit their students, content receivers want certain things from you—the provider. First, a videoconference description that is concise but complete helps receivers decide immediately whether or not they want to book your program. Connection policies and procedures should be clear as well. This helps the receivers know up front what they should expect and cuts down on potential confusion after the session is scheduled. For example:

- How many students can participate?
- What is the price structure (ie, interactive vs view only; surcharges for larger receiver groups) for the program?
- What should receivers do to cancel?

- What are the refund policies?
- What connection options (ISDN, IP, bridged) are there?

Additionally, there should be a phone number and/or an email address the receiver can use to ask questions and address concerns. Since it’s difficult to receive telephone calls at school, teachers like it best when there’s someone to answer their calls. But if that’s not feasible, a provider contact who responds to email queries quickly is appreciated. It’s also helpful for receivers to know which method—telephone or email—is the best way to communicate.

Once a program has been selected, the receiver is ready to book a date and time. Scheduling is an organizational aspect of videoconferencing that, if done correctly, can make a potentially bumpy process less difficult and time consuming. Content providers should respond to scheduling requests with a quick turnaround—24 hours, if possible. If the date and time the receiver is requesting isn’t available, give several other options, and be clear about time zone. This helps minimize the number of communiqués required to make a firm reservation.

After booking, you need to transmit the instructional materials that will be used before, during and after the videoconference. Ideally, the trio of materials should be available via your website. Teachers like to get materials well in advance of the event. Both teachers and students will be better prepared and have a better understanding of what is expected of them, if they have time to review materials. If the materials aren’t available on the web, or if the session was scheduled late, get them to the receiver as soon as possible.

Technology got you down? Try to prevent problems before they occur! Receivers want you to be proactive by providing contact information for technical staff. Be sure to conduct a test connection well before the session date to allow time for troubleshooting. Receivers also need a direct phone number in your DL studio that they can call during the event, if there is a problem. In addition, it's a good idea to let the receiver connect a few minutes early on the day of the event.



Norman McGrath

Content providers like MTR, NY, encourage classes to connect early for a videoconference lesson.

During the event itself, the receiver depends on the presenter for a high-quality experience. Remember that receivers come to you for a learning experience they cannot provide in their classrooms. They look to you as the expert and, consequently, being knowledgeable and well-prepared is critical. It's up to you to ensure that the lesson is grade-appropriate. Also, try to "read" the students and keep them engaged.

Reading from a script diminishes the interaction since you are often looking down and not at the class/camera. Be sure to encourage interaction by using a few good higher-order questions, rather than lots of lower-order questions that serve only to drive the lesson forward. The right learning activities can encourage interaction. Allow time for students to ask their own questions. Use lots of visuals such as documents, artifacts, graphics and even PowerPoint presentations. Provide opportunities for students to construct their own knowledge and present their findings to you as the expert.

Variety is one of the keys to success when it comes to holding students' attention. Pace your presentation with a mix of activities. Use various media, short instructional segments, a range of teaching styles, and be sure to intersperse humor during your presentation. Be careful with movement, especially when connecting via the Internet. Connections can sometimes get choppy!

Finally, speak up if there are any problems—technical or instructional—during the event. Often, you are the more experienced videoconference user and the receiver appreciates your help and advice.

What should providers do after the videoconference is over? Stay in communication! Receivers appreciate presenters who make themselves available to answer follow-up questions from the class via a letter or email.

What providers want receivers to do

Videoconferences are not one-sided. Providers are expecting you—the receivers—to do your part as well! Providers do their best to get their information out there. In return, they ask receivers to read it carefully. After you've read the provider's policies and procedures, be sure to contact the provider with any unanswered questions or concerns.

When scheduling a session, communicate your school's policies and procedures and have a phone and/or email where you can be reached easily. Be sure to communicate any special student needs. Don't be shy about letting the provider know what you

Communication Boosters

Clear communication between the provider and receiver helps ensure a successful videoconference. Be sure to...

- Define the best way to communicate
- Ask questions early
- Respond quickly
- Share technical staff contact information
- Discuss lesson content before event
- Discuss provider/receiver roles for the lesson
- Stay in touch during and after the conference

want and what you need. Are there time constraints? Do you have bells ringing? What happens if the conference starts late? Will the program have to be shortened? Also, work out the lesson protocol with the provider. For example, will the teacher call on students to answer questions? The content provider may need you to distribute materials to students, monitor small group activities, and facilitate the lesson in other ways.

In terms of technology issues, providers want the same things you do. Preparation and anticipation will diminish the number of technical problems. Give the provider the name of your technical point person and his or her contact information (ie, a cell phone number where the person can be reached during the event). Be sure to test connect before the session and be prepared to connect early on the day of the event.

It's helpful to create a learning-conducive environment by setting up the room and equipment ahead of time. Also, alert school administration to the scheduled event to avoid fire drills and school announcements during the conference.

Your students should be prepared for the connection. Pre-event activities are specifically designed to enhance the videoconference lesson by enabling students to interact knowledgeably with the distance learning educator. Consequently, providers count on you to complete the suggested pre-conference activities with your students. In addition, the class should develop questions for the presenter beforehand. Also, be sure to familiarize students with the technology.

Videoconferences are most effective when the classroom teacher is fully engaged along with the students. Work as a partner with the provider throughout the lesson. Specifically, you should monitor how well the students are understanding the content, make sure questions are being asked and answered adequately, and manage classroom behavior. Additionally, providers want you to speak up if there are any problems during the event. Don't wait until the program evaluation to voice grievances.

What should you do after the videoconference is over? Reinforce the learning by conducting the provider's post-conference activities. This not only helps students retain what was learned, but bolsters the perception that the connection was a real lesson, not a novelty.

Finally, don't forget about the provider! Be sure to complete and send in the provider's evaluation or feedback form. Tell the provider about the strong points of the videoconference and give constructive feedback about improvements that could be made. You might even include some quotes from your students! ■



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Making Connections

Cleveland Museum of Art and South Puget Intertribal Planning Agency

A recent videoconference between The Cleveland Museum of Art (CMA) in Ohio and Bobbie Bush in Washington State exemplifies one of the most exciting things about videoconferencing: It puts people together who probably wouldn't have met otherwise. Bush is the project coordinator for the South Puget Intertribal Planning Agency's (SPIPA) Five Tribes Intertribal Pathways to Success program.

SPIPA, which is based in Shelton, WA, has a US Department of Education grant geared to improving college readiness for students of the Five Tribes. The goal of this grant, specifically from the Office of Indian Education, is to raise scores on standardized tests in subjects such as math and English. As progressive planners, the SPIPA staff noticed that standards-based content is available from informal educators, such as museums and science centers, via interactive video distance learning. Bush thought The Cleveland Museum of Art's new videoconference, "Tessellation Exploration," sounded interesting and aligned well with the grant. "Tessellation Exploration" provides an art-filled experience, using museum objects and patterned surfaces to explore different math concepts related to tessellations and polygons.

A videoconference took place between Bush and the CMA team. CMA's lead presenter Arielle Levine spoke at length with Bush, demonstrating parts of various videoconference topics and showing objects from the CMA's database of more than 20,000 digital images. "It was good preparation for the future," says Bush. "I got to know the presenter, learned about the tessellation program and was introduced to some of the CMA's collection." In addition, she had a chance to discuss arts integration into curriculum and received an overview of CMA videoconference offerings. Bush intends to share this information with the members of the Five Tribes—Chehalis, Skokomish, Nisqually, Squaxin Island and Shoalwater Bay. Already, she is looking at potential

applications for videoconferencing. One tribe with whom Bush works may be holding a science camp in the summer. She may connect with multiple content providers around a subject, such as ethno-botany, which may be an educational strand at the camp.

The outcome of the connection was extremely positive for CMA as well, according to Dale Hilton, Associate Director, Education and Public Programs, Distance Learning at CMA. "First, we had a wonderful conversation and an opportunity to learn more about Bobbie's work," she says. "Secondly, we were able to demonstrate to a group of museum supporters, who happened to be in the building, how far videoconferencing reaches. These museum goers were delighted with the prospect of national communication and potential outreach to students geographically removed from Cleveland." ■



SPIPA learned more about Cleveland Museum of Art's "Tessellation Exploration" lesson, which uses museum objects to explore math.

Designing Effective Videoconference Lessons: An Overview

Interactivity and unique resources are “must have’s”

By Karen Mack

Content providers and receivers have long agreed that among the components of effective videoconferences there are two “must have’s.” First, the lesson must use interactive strategies that foster student construction of knowledge. In addition, the lesson must incorporate resources, both human and object-oriented, that would not normally be available in the classroom. A major outcome of *No Child Left Behind* has been the tightening of learning standards and more stringent testing at the state level, adding another critical ingredient to the mix. Videoconference (VC) lessons must also be integral to accomplishing curricular objectives. Designing programs that meet this criterion is not an easy task. This article explores the VC lesson as the focal point of a complete unit of instruction, which includes pre-conference lessons and activities that direct students’ attention toward the content of an upcoming VC, and post-conference lessons and activities that solidify and extend the knowledge gained before and during the connection. A formal unit approach such as this provides a sturdy framework for effective videoconference curriculum design.

A good lesson is a good lesson

Before we begin, take a few moments to think about what you already know about good lessons. Don’t worry about the unit plan or VC aspects for now. Just concentrate on the characteristics of good classroom lessons and formulate some adjectives and short phrases to describe them—“engaging,” for example. Here are some thinking dots to help you find your place when you’re done.....

Most educators characterize good lessons

as exciting, effective, content-rich and standards-based. Most emphasize the importance of:

- Fostering critical thinking
- Adding significantly to a student’s knowledge base
- Enabling students to do something they couldn’t do before (or do it better)
- Matching age, grade, and ability
- Addressing different learning styles
- Having long-term impact

Many educators talk about the necessity of students constructing their own knowledge and/or working collaboratively to construct knowledge. And, of course, “technology-rich” is another frequently listed characteristic. You probably came up with others as well, but from this short list, we can see that there are a lot of things that need to be going on in a lesson, regardless of its subject or grade level. Bottom line? A good lesson is a good lesson.

How do we learn?

There is an overwhelming amount of research, and innumerable theories stemming from that research, about how we learn. For our purposes, let’s keep it simple. It is generally agreed that what we remember of what we see, hear, say, do (and combinations of these) serves as an indicator of how we learn. If we analyze the retention percentages in short- and long-term memory (STM and LTM) of each of these modalities and their various combinations, we get an insight into how best we learn. Here’s a question for you: How long is short-term memory? Need some thinking dots? Here you go.....

George A. Miller (1956) theorized that a person can retain 7 perceptual items (plus or minus

2) in short-term memory, which lasts only for about 20 seconds! (By a process called “rehearsal,” we can keep an item in STM longer, but it remains part of the possible 7.) Within a few hundredths of a second, we choose whether or not to accept a new perceptual item into STM. If we do accept it, another item must be pushed out to make room for it, either by “forgetting” the displaced item, or moving it into LTM. The transfer of items from STM to LTM involves encoding a perceptual item into a conceptual one, that is, one that has meaningful information. This encoding must take place for learning to occur. Learning is demonstrated, that is, becomes measurable, when it can be successfully retrieved from LTM. (If you are wondering how long LTM is—many theorists believe conceptual items stay with us forever, though for a variety of reasons, may not always be retrievable.) How do we get students to deem perceptual information worthy enough of conceptualization? Commonly accepted retention percentages provide a good clue.

In short-term memory, we retain

- 10% of what we read
- 20% of what we hear
- 30% of what we see

After one month (LTM), we retain

- 8% of what we read
- 14% of what we hear (with an 80% distortion rate!)
- 22% of what we see

Watch what happens, though, when we start combining and adding interactivity.

After one month (LTM), we retain

- 42% of what we hear, see and watch
- 72% of what we learn that is connected to experience, whether real or not!
- 83% of what we learn when engaged in a challenging activity
- 91% of what we teach

While these are generalizations, they do lead us to some obvious conclusions that apply to most learners, regardless of their learning style. Take a moment to draw your own conclusions.....

Clearly, students need to have a stake in the content. They must see it as relevant to their own experience. Remember, they are choosing what to encode into LTM. It needs to be conceptually appealing to be accepted for conceptualization! Participation in a challenging activity nearly doubles retention when compared with watching a demo. It doesn't matter who is giving the demo. The classroom teacher and content provider expert get much the same impact for their efforts—about 42% retention in LTM. Demos need to be coupled with students “doing” to ensure both storage in and retrieval from long-term memory. Now, let's apply these insights to the unit design.

Curriculum design elements

Just as there are many theories about how we learn, there are many different models of curriculum design. Some start, for example, with the assessment and work their way “backwards” through the formal elements of a curriculum, while others are “project-based” and may or may not have an accompanying formal supporting curriculum. Whatever the design style, however, there are several key elements that should be considered.

Instructional goals and performance objectives

Many educators begin the formal process of creating a unit of study by writing clear statements of the behaviors students will be able to demonstrate as a result of instruction. Instructional goals are broad statements which may or may not be measurable, while objectives are specifically geared toward performance and, therefore, are always measurable. An instructional goal, for example, might be, “Students will appreciate the diverse cultures that make up the United States,” while one of its related performance objectives might be, “Students will create a page for a picture book about the various ways different cultures celebrate holidays.”

Unit goals and objectives should emanate from state and national learning standards which most closely match the mission and content capabilities of your organization. Before developing your goals and objectives, consider these questions:

- What content or expertise can you offer that no other organization can provide as well as you?

- What artifacts/collections do you have to tap into?
- Which elements of your institution’s mission have universal appeal?
- What learning standards do your onsite programs address most successfully?

Answering these few questions about who you are and what you have to offer will not only assist you in establishing program goals and objectives, but also help ensure that the programs you develop will be competitive.

Essential questions

Goals and objectives can be classified as the content aims of a particular unit or lesson. An essential question, on the other hand, addresses its overarching concepts. It cannot be answered with a yes/no, or a simple list. It has no “right” or “wrong” answer. It requires students to tap into higher-order thinking skills as they construct their own meaning. An essential question can be asked throughout a lifetime, each time from a new perspective, and each time responded to differently as life experiences bring new insights and attitudes. “What would you be willing to do for freedom?” is an appropriate essential question for a unit on immigration. For environmental science units an essential question might be, “Do we control our environment or does our environment control us?”

Content analysis

Keeping the goals, objectives and essential questions in mind, the next step is to identify the knowledge and skills students will need to acquire to successfully reach the learning objectives. There are different methods of developing this “content analysis.” Personal comfort zone with a format and, sometimes, suitability to content will guide your selection. Common methods are:

- **Outline**—Major topics to be covered are the main framework, with the subdivisions and their development listed under each in a traditional outline format.
- **Graphic Representations**—Charts and diagrams help organize and prioritize content.
- **Task Analysis**—If your unit/lesson teaches students a specific skill, a step-by-step list of what must be done to acquire the skill works perfectly.

Another method, storyboarding, works well for planning the actual VC connection. While time-consuming to create, it helps organize content and resources and takes into account the visual and audio components of the medium. It also serves as a guide to presenters, keeping the lesson more uniform when two or more staff members are delivering the same program, and makes training new presenters easier. A detailed script will work just as well if the visuals are fully described. Storyboards and scripts should be flexible, include the planned interactive elements, and accommodate the presenter’s delivery style to minimize uncomfortable speech patterns and/or stilted delivery.

Whatever method is chosen, once completed, the content analysis should be checked by walking through its steps from the student’s viewpoint. Generally, it will need some additions. This is a good time to think about how the steps can be proceduralized for differentiated instruction as well.

A word of caution: It’s very tempting to skip the content analysis altogether and go directly to writing up the procedures. However, when this pre-procedural thinking and documenting process is bypassed, the lesson is never as clear or as strong as it would be had the analysis been undertaken.

Prerequisite knowledge

Prerequisite knowledge is particularly important to remember when you are delivering to school systems across the nation. Since every state and school has a slightly different scope and sequence to its curriculum, you can’t assume that students will have the prerequisite knowledge/skills that your lesson requires. Think of the prerequisites as a disclaimer. In effect, you are stating, for example, “Yes, we will be covering characters in the Great Gatsby, but you had to have read the book before we can do that.”

Materials

Hands-on materials can make a VC program stand out among the myriad of those available. Teachers and students alike love them! So, in addition to the usual suspects—organization background information, pre- and post-videoconference lessons, teacher guides, student handouts, etc—consider creating a “Museum in a Box” kit with manipulatives to be sent to the school and used during the connection. If your VC explores the composition and texture of different rocks for identification purposes, include a variety of samples to be passed around and used in a “Name

that Rock” activity. Your presentation becomes meaningfully interactive and engaging as students look for layers and feel for texture! Logistically, it is easier to manage a kit with “disposable” items than one with items that must be returned. Small swatches of cloth, acorns, rocks, seashells, seeds, computer-generated graphics and maps are all low- or no-cost items that work well in programs. If you decide to include higher cost items that must be returned, you’ll be happy to learn that content providers who are currently doing so report a high rate of success in getting the materials back. A cautionary word: Most providers move away from this model as their bookings increase simply because of the turn-around time needed to send the kit to the next receiver.

Procedures

At this point in the development process, writing out the lesson’s procedures should go quickly. You may wish to include an interactive warm-up/motivational activity. It has been observed that if students are not active participants within the first five or so minutes of a videoconference, they will not be fully engaged for the remainder of it, no matter how interactive it later becomes. Since your pre-conference kit already includes background on your organization, keep “stage-setting” to a minimum—no more than one or two minutes. Then move directly into interactive mode. Ideally, students will have created or learned something about the VC content in their pre-conference lesson. The “sharing out” of these objects and informational items at the beginning of the conference is a great way to initiate student participation and interaction with the presenter.

Continue to develop the lesson procedures step-by-step, using your content analysis or storyboard as your guide. Include as many opportunities as possible for students to interact with the presenter and the content. Before closing the program, allow time for additional student questions and conduct a discussion of the lesson’s essential question(s). The actual closure should include a summary and culminate with a bridge to the post-lesson. This formula not only helps tie up loose ends, but also emphasizes that the knowledge gained during the pre-videoconference lesson and VC has ongoing meaning and merit. (Don’t forget...students are choosing what to encode into LTM and what to let go.) Of course, the actual connection will never (hopefully) go exactly as outlined because of the student interaction. But it is important to keep an eye

on the prize—enabling student achievement of the instructional goals and objectives and helping them respond critically to the essential questions.

Assessment

The final major curriculum component in our model is assessment. Teachers appreciate its inclusion and providers should think of it as a required component of a curriculum unit. Each lesson in the unit should offer some form of assessment tool, whether it be post-lesson discussion questions, a “quickie quiz”, or a formal test. Simple rubrics, performance tasks, and written and creative responses are highly effective tools as well. The type of assessment you select should be based on the type of student proficiency you intend to measure. And that, as we all know by now, is determined by the lesson’s instructional goals and objectives, which were grounded in state and national learning standards! Unit assessments should also be considered. A “final project” that requires students to apply their new-found knowledge and skills to a real-life situation will, as we have discovered, improve their retention of them in LTM.

Alternate “Plan B”

The classroom teacher is responsible for having alternate curriculum plans in the event of technical difficulties during the conference that force rescheduling of the connection. A handful of content providers do offer suggested activities if there are problems, but this is optional.

Final alignment review

You’ve made your curriculum “list,” checked it, and now it’s time to check it twice. While an easy concept to grasp, this final alignment check gives the best curriculum designers heart palpitations as they struggle to let go of things they’d like to include, but that don’t fit into the overall goals and objectives. Basically, every element of the unit or lesson needs to correspond and make complete sense in relationship to each of the others and all of the others. If the performance objectives are how to bake and decorate a layer cake, there should not be a segment on how to bake and decorate cookies.

Streamline the unit and its lessons so that everything you say and do and everything the students say and do advances them toward the stated goals and objectives. A good way to test whether something fits is to remove it totally. What impact does its removal have on students’ abilities to accomplish the goals

and objectives, and answer the essential question? If it clearly belongs, give it adequate coverage. If its exclusion has minimal impact, put it on the back burner for “if there’s time.” But if it doesn’t directly impact on student achievement of this particular unit or lesson’s objectives, ditch it! Think “spring cleaning”. You hate to give some things up, but the next day you’re happy the house is in order and you really don’t miss that once precious Furbie at all!

Design into practice: an example

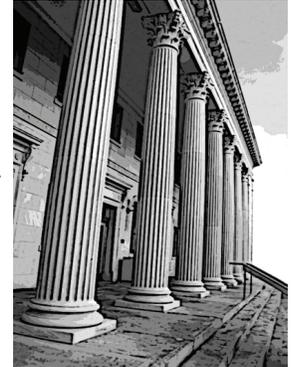
The Manhattan School of Music (MSM) uses the formal unit model outlined above most effectively in their “Music, Melody and Me” program for grades 3-5. In two pre-conference classroom lessons, students learn about musical families through Internet research, and then create their own instruments using directions provided in the teacher’s guide. At the beginning of the VC itself, students share their understandings of musical families and present their instruments to MSM faculty member Earl Carter. Next, Carter teaches about motives (the building blocks of musical themes) by illustrating simple ones on the piano and by having students listen to pre-recorded pieces and identifying the motives within them. Once the concept is fully understood, students create their own motives, using their own instruments. A lively exchange ensues as Carter sits down at the piano and magically transforms the student-created motives into full-blown compositions to the students’ absolute delight. In the post-conference activity, students are challenged to build on their motives and create melodies of their own.

But what if students haven’t done the pre-lessons? There is some concern that students may not be prepared to participate fully in the VC lesson. EEZ members have found that if the pre-lessons are truly integral to the videoconference and this fact is emphasized in prior correspondence with the teacher, there is a far greater chance that the activities will be completed. Of course, even this doesn’t guarantee “program readiness,” so alternatives need to be designed. Wendy Wilkerson, Coordinator of School Services at the Indianapolis Museum of Art, develops programs with that in mind. Students who should have created their own artwork in a pre-lesson, but didn’t have the opportunity to do so, are given a few minutes to think about how they might have created it. As to “Music, Melody and Me”, Christianne Orto, Assistant Dean of Distance Learning & Director of

Recording at MSM, notes that Carter is at the ready to direct students to use their hands and feet to “clap and tap” out their motives if they haven’t created an instrument.

Some closing thoughts

This formal approach to curriculum design may seem a little overwhelming. But it doesn’t have to be. As a start, you might want to look at your most popular onsite programs. Repurposing existing programs is a good way to get VC programs up and running quickly. But select wisely, since onsite success does not always translate into distant triumph. Gene Carlucci, Associate Curator of Education at the Intrepid Sea, Air & Space Museum, says that one of the museum’s strongest and most popular onsite programs, “Character and Leadership,” didn’t lend itself to the VC environment at all. “Boats that Float” sank and “Planes that Fly” crashed in that environment as well! But if a school wants to book the Intrepid’s “Geography” or “World War II” programs, both totally in line with NYS and National Learning Standards, and filled with non-stop action, animation and participation, it better do it early!



Solicit teacher comments and suggestions when choosing new content for development. They can help you focus in on important curricular goals and objectives. Consider thematic approaches, offering a related series, and time-lined programs that can be easily added to in the future. In short, plan ahead. Finally, while designing, think about all those adjectives: engaging, exciting, enabling, content-rich, standards-based, critical thought provoking, differentiated, constructivist, impactful. In short, think good lesson.....

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Videoconference Know-How

by Susan Neale

Show me a successful videoconference program and I'll show you a tech coordinator or teacher who is a great planner. Videoconferencing requires planning before, during and after the connection. Here's a checklist of things to keep in mind when planning your next connection.

Before the Videoconference Event...

- √ Choose a program that matches your curriculum
- √ Contact the program provider to confirm the program is a good match
- √ Schedule the program
- √ Contact presenter (scheduler and presenter may/may not be the same)
 - Discuss objectives, student needs
 - Discuss your expectations/presenter's expectations
- √ Schedule a test connection
- √ Prepare students for the event
 - Do provider's pre-event activities
 - Prepare questions for provider
 - Explain technology to students (connect with another class, if possible)
 - Discuss videoconferencing etiquette
 - Explain student role in a successful videoconference
- √ Conduct a test connection with the provider

Day of Videoconference Event...

- √ Arrange a room so all students are on camera and close to it
- √ Set presets
- √ Do a quick test of equipment with another long distance site
- √ Review videoconference etiquette with students
- √ Dial up at least 10 minutes before the scheduled event and leave the connection in place

During Videoconference...

- √ Do a sound check. If sound is poor, you may need to redial
- √ If your students have prepared questions/materials they wish to share during the conference, let the provider know before s/he begins the program
- √ Make sure your objectives are being met
- √ Ask questions
- √ Encourage students to interact. Be prepared to repeat their questions and answers

After the Videoconference...

- √ Engage students in a review of the program. What did they like/dislike? What did they learn? Do they have any unanswered questions?
- √ Do a post-visit lesson (providers' activity idea or your own) that extends the learning experience by applying what students have learned.



Teacher Materials: Creating a Comfort Zone

EEZ members share their views on support materials

By Susan Neale

There's little debate among content providers and receivers about the value of teacher materials. By and large, everyone agrees that materials sent prior to a connection can make teachers and students feel more confident and comfortable, two key ingredients for a successful videoconference lesson. Finding a consensus among videoconference users as to what should be included in a teacher packet is another story. When asked to share their views on teacher materials for this article, no two experienced providers or receivers gave the exact same response.

If you think about it, this makes perfect sense. A videoconference lesson taught by a zoo isn't going to be like the lesson taught by an art museum or even by a physical sciences center, so why would the teacher materials be the same? Materials often reflect the institution's mission, which was formulated long before televisions started talking and listening. In addition, they often reflect the distance learning department's educational philosophy and teaching style. And let's not forget the critical influence of each lesson's unique learning objectives on the design of materials.

So where does that leave providers who are creating a teacher packet for the first time or who want to revise materials already in use? It leaves them with a lot of choices about what to include, how much to include, and how to deliver the finished package. We asked a group of providers and receivers to share their opinions on teacher materials to help guide other providers through this decision-making process.

Why bother?

If you're like many providers, your days are swamped with the scheduling, test connecting, presenting, and billing chores for videoconferences. (Maybe you're

even teaching onsite lessons as well as virtual ones?) It's hard enough to find time to answer a teacher's simple email query, much less find large blocks of time to develop a packet of teacher materials. If this is the case, you may be asking yourself: "Are teacher materials really necessary?" According to providers and receivers, the answer is a resounding "yes."

Perhaps, the most compelling reason for creating teacher materials is that receivers expect you to have them. Rebecca Balk, School Programs Specialist at the Buffalo Zoo, says technology directors always ask: "Are there materials?" It's not surprising that receivers want as much information as possible about a videoconference lesson. Videoconferencing is still new to the vast majority of schools, and school administrations won't generally earmark money for anything that doesn't demonstrate relevance to classroom curriculum and educational standards. Simply put, teachers can't afford the time or the money for an experience that falls short of their expectations. Pre-visit information can give receivers peace of mind by helping them 1) choose a program that matches curricular goals and 2) plan for a successful learning experience.

Generally speaking, videoconferencing program descriptions found on providers' websites or in online videoconferencing directories amount to only a sentence or two. A single sentence may suffice when describing flambé on a French menu, but it does little to convey the scope of a 50-minute videoconference. One- or two-sentence descriptions are always lacking and often confusing. Teacher materials provide additional information that not only helps to clarify a videoconference lesson, but also helps to distinguish it from other lessons. This is particularly important when your program focuses on a topic—such as the rainforest, animal adaptation,

Native Americans, or the Holocaust—that is being offered by multiple educational sites.

After a program has been chosen and scheduled, the materials help the teacher and students prepare for interaction—before the videoconference as well as during the connection. “Once the teacher has seen the materials,” notes Balk, “a dialog can occur. We can discuss tailoring the program to put more or less emphasis on certain topics.” Jill Bell, Videoconference Consultant and Trainer for the Cape Elizabeth School System, Cape Elizabeth, ME, has noticed that both teachers and students are more confident about their participation in the videoconference lesson when the provider’s basic expectations are clear. Their confidence gets a further boost from materials that prepare them to meet those expectations. Not only is there more interaction, but the quality of interaction is improved. Students ask and answer more high-order thinking questions.

Certainly, better communication is reason enough for creating teacher materials, but materials also provide added value. Receivers feel they are getting more for their money when there are teacher materials, especially wrap-around activities. The pre- and post-conference activities, along with the videoconference itself, create a complete instructional unit. “It’s like getting a meal—appetizer, main course, dessert,” explains Suzy Lesser, Deputy Manager of School & Family Programs at the Museum of Television and Radio (MTR), NY. “It makes the videoconference experience more meaningful.”

What’s in your teacher packet?

If “communication” and “added value” sound like marketing terms, there’s a good reason—teacher materials are great marketing tools. They can promote a videoconference lesson, contribute to its success, and keep receivers thinking about your site long after they’ve hung up the videoconference call. According to Suzy Lesser, “Teachers say, ‘I chose your program because of your materials.’”

So what’s in MTR’s and other providers’ teacher packets? In some cases, it’s simply a pre- and post-videoconference activity idea. In other cases, it’s a bound document filled with a slew of support materials. Besides pre- and post-videoconference activities, a teacher packet might include one or more of the following:

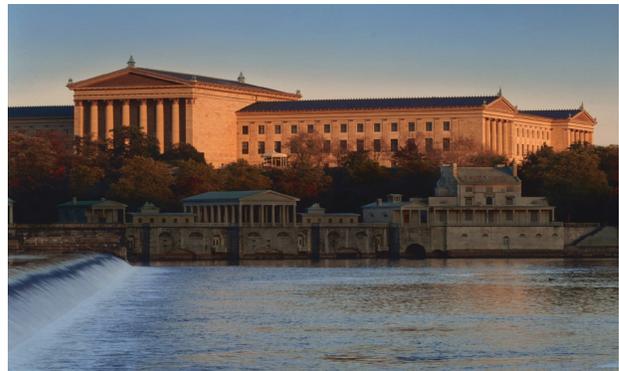
Site profile

Background information about the provider’s site

can make students feel less intimidated about an impending videoconference. “They don’t know us,” explains Candace LeClaire, Distance Learning Coordinator at the Philadelphia Museum of Art. “Our teacher materials are designed to create a comfort level about the artists, their works, and our museum.”

Lesson plan

A lesson plan or outline is one of the best defenses against the receiver lament: “The program wasn’t what I expected.” In addition to the lesson synopsis (usually a brief paragraph) and learning objectives, the plan should describe each segment of the lesson, including planned activities, and the intended use



Philadelphia Museum of Art’s materials are designed to create a comfort level about the artists, their works, and the museum.

of the site’s collection (ie, artworks, artifacts, live specimens) and other visuals (ie, video clips). Often, the lesson plan indicates the time allotted for each activity. “A more in-depth description of the videoconference presentation is crucial for us,” says Bell. “The most repeated teacher suggestion has been for better communication of lesson details. This suggestion usually comes after a teacher has noted that ‘the lesson was too elementary for my students’ or ‘my students already knew the basics—I thought this would be an extension of what they had already studied.’”

Educational standards

When trying to choose a videoconference that is a good curricular match, technology coordinators and teachers appreciate programs that have been aligned to educational standards. Receivers understand that providers can’t align their programs to the learning standards of all 50 states. However, alignment to national standards, or even to the educational standards of the state where the provider is located, is an invaluable guide.

Event materials

Materials that are used during the actual videoconference event or lesson may consist of worksheets, templates, and/or a list of items needed for a hands-on activity. Some providers are reluctant to put paper into the hands of students, particularly those in primary grades, because the videoconferencing microphones are so sensitive to sound. For others, the benefits outweigh the risks. For example, The Cleveland Museum of Art (CMA) has created “viewing guides” to be used during the connection. “The guides help students stay focused during the presentation,” notes Dale Hilton, Associate Director, Education and Public Programs, Distance Learning at CMA.

Vocabulary

A vocabulary list or glossary is often included. “Our lessons don’t teach vocabulary,” explains LeClaire, “but we include a list because we feel it might make the students and teachers more comfortable. It’s also helpful for teachers during post-visit discussions.”

Web/print resources

The “helping” gene seems dominant among content providers. Unable to resist sharing what they know to ensure a successful videoconference experience, providers often include useful web and print resources. “We like to give a few websites we’ve found really useful,” says LeClaire. “The links are often ones that offer other great links.”

“We want our materials to spark curiosity and understanding.”

Dale Hilton, CMA

An equally important, though perhaps less obvious, reason for print and web resources is to boost the teacher’s enthusiasm about the videoconference topic. “I want the videoconference to be an intellectually stimulating experience for the teachers, too,” stresses Hilton. “One of our goals is to create a context the teacher will enjoy. We want our materials to spark curiosity and understanding.”

Teachers who are prepared and enthusiastic about the videoconference topic are more likely to take an active role in the event and ensure its success. According to providers, the teacher sets the mood for the videoconference. “Students react the way their teachers react, especially in high school,” explains Balk.

While MTR, NY, lists web resources in the teacher materials, Lesser offers one caveat to their inclusion. “It’s a bit tricky,” she says. “For one thing, web links change. In addition, you don’t want the websites listed to look like they’re endorsed by the museum or to imply that they’re the only links available.”

General connection tips

To ensure the best videoconferencing conditions, some providers send out a page of videoconferencing “how to’s,” such as tips on setting up a classroom and equipment, testing connections and facilitating student interaction. Providers say they are just trying to “cover all the bases,” especially with novice receivers.

Backup plan

In the event that the connection fails and the videoconference lesson can’t be delivered, receivers appreciate teacher packets that contain a “Plan B” activity.

Evaluation form

Most providers want feedback. An evaluation form sent in advance saves the provider time after the videoconference.

Wrap-around activities

When creating anything new, it’s often helpful to see what’s already been done. This article includes a list of EEZ providers who currently offer their teacher materials online. If you peruse these providers’ websites, you might be discouraged by the lack of conformity. Don’t be. As mentioned earlier, providers take different views on what should and shouldn’t be included in teacher materials. However, if you understand some of the considerations that guided their choices, it might help you make your own choices.

At this point in the evolution of educational videoconferences, the phrase “no talking heads” is a cliché. A videoconference lesson that relies solely on a presenter talking to a classroom, without

(at the very least) the aid of examples from the site's collection, probably won't engage students. Successful videoconference lessons have taken cues from traditional lesson planning, incorporating a variety of teaching tools and activities to motivate and encourage students. Providers recognize that a variety of tools and activities are equally valuable when designing pre- and post-videoconference experience. That said, most providers shy away from actually creating formal pre- and post-visit lesson plans. They prefer activity ideas that are more open-ended, allowing teachers and students to venture off in different directions, depending on their interests, learning styles, and curricular goals. "I want the teachers to make the choices," says Lesser. "I want them to decide how they are going to use an activity and how much time they want to spend on it."

The Philadelphia Museum of Art takes the concept of choices further by offering multiple activities, called Idea Generators. "The Idea Generators match our style of teaching," explains LeClaire. "We want to make suggestions that can fit into the individual classroom experience and, therefore, are more meaningful. Since we teach to so many different kinds of classes—science, history, art—with so many different learning styles, it's hard for us to say: 'Do this.' The videoconference itself is fairly rigid; we don't want the pre- and post-videoconference experience to be. In addition, what works for a teacher one year, may not work the next year because of a different class. The Idea Generators also give teachers extension activities for those students who need them. We want to enable students to explore different angles, to explore their interests."

Receivers like Bell appreciate having choices. "Our preference is to have a selection of possible activities to choose from and incorporate into the curriculum. In this way, we can better individualize student instruction and hopefully avoid redundancy."

While developing open-ended activities rather than a formal pre-visit lesson plan has benefits, there are a couple of drawbacks you may want to consider. First, not all teachers want to choose how to prepare their classes, especially when they've never seen the videoconference lesson. "Some teachers feel more comfortable with a well-scripted lesson," notes Helene Lepselter, a technology teacher at Chatterton Elementary School in Merrick, NY, and a member of Nassau BOCES Videoconference Service. Secondly,

open-ended activities aren't easy to align with the videoconference. Without alignment, there's the risk that the pre-videoconference activities might not provide effective preparation or worse, they might cause confusion at connection time. Some providers report that they no longer offer pre-visit activities because students are over-prepared for the

"We want students to 'give back' to the experience."

Suzy Lesser, MTR, NY

videoconference. Careful alignment of the wrap-around activities with the videoconference should solve this problem.

Whether a provider offers a formal plan or an activity, the pre-conference experience should help to explain the topic, stimulate interest, and generate questions to be asked during the connection. "We want students to 'give back' to the experience," notes Lesser. "That won't happen, if the students aren't stimulated."

Hands-on activities are often used to meet all three pre-conference goals. Often, devising a hands-on activity for the actual videoconference lesson is a challenge because of the nature of a site's collection. As an alternative, providers will suggest a hands-on experience before and/or after the connection. Such activities may also employ a variety of collaborative and individual tasks, such as researching on the Internet, conducting an interview, listening to music, creating artwork or collecting scientific data.

For MTR, NY, another consideration when designing pre-visit experiences is whether or not an activity helps to set the stage for the videoconference. "Most topics we cover are huge," explains Lesser. "The pre- and the post-activities help to focus the learning experience. For example, our Vietnam program is content heavy. We're able to focus the experience by having the students do an oral history of a person who was alive during the Vietnam War for the pre-visit activity and analyze music that was popular during the era for the post activity."

While most pre-visit activities are meant to inform students about the videoconference topic, sometimes students are asked to create something to

share during the videoconference's warm-up activity. Students are more eager to interact, if they've completed a pre-videoconference activity that generates opinions, questions, or a product. However, it's also a bit risky. If the provider is expecting the students to share the results of, say, a class survey or individual artwork, but the class didn't have time to do the activity, it can throw off the videoconference. Needless to say, the provider must have a backup plan. "Plan B" could be a simplified version of the pre-visit activity that can be done quickly at the start of the connection. If that's the case, expect it to be less thoughtful and more rushed than the activity would have been if it were done ahead.

Not surprisingly, most providers agree that the goal for the post-videoconference activity is to build on the pre-visit and videoconference experiences. "We want to give real value to the experience by extending it beyond the videoconference," stresses Hilton. "We want teachers and students to continue to feel engaged, excited. To do this, we ask ourselves,

Teacher Materials: Click and Compare

Are you trying to decide what to include in your program materials? Are you curious about what other providers have included in theirs? Here's a list of providers with online materials...

Albany Institute of History and Art

<http://www.albanyinstitute.org/resources/distlearning.htm>

Cleveland Museum of Art

<http://www.clevelandart.org/educf/distance/html/4167935.html>

Indianapolis Museum of Art

<http://www.ima-art.org/>

Liberty Science Center

<http://www.lsc.org/education/eft/econnect.html>

Museum of Television and Radio

<http://www.mtr.org/edu/index.htm>

The National Baseball Hall of Fame

<http://baseballhalloffame.org/education/units/default.htm>

'How can we make the videoconference applicable to class experience and the real world?' During our "Museum Careers" videoconference, students actually look at the museum's job application and personnel chart."

Post-visit activities often take the form of a challenge. Students are asked to apply what they have learned to a real world situation, create a product (ie, essay, art work), or solve a problem. Teachers appreciate these activities because they offer an assessment opportunity. Lesser likes to suggest activities that not only have the students doing something, but that also incorporate other technologies. "I like to give a few choices that will expand the experience and then let the class decide what to do based on time, interest and available technology. For our Vietnam videoconference, we listen to music of the era. The post-activity suggests creating a play list or burning a CD, depending on the technology available. I'd love to reconnect to view the students' finished post-activities," she added, "but it's never happened."

Where do all these pre- and post-visit activities come from? Once again, providers approach the development of activities in many different ways. Some providers borrow from their onsite lessons, while others go online for inspiration. "Whenever I'm developing a new lesson or materials, I go online," says Lesser. "I see what I like and what I don't like about what's already been done." Some educational sites bring in teacher consultants to help create materials. Finally, for providers who are too strapped for time to create activities and can't afford to hire outside help, interns with education degrees can be an invaluable resource in the development of teacher materials.

Going postal?

Presentation is another important consideration when developing teacher materials. "We've received instructions to prepare materials for use during a videoconference that were too time-consuming or confusing to teachers," says Bell. Teachers don't have time to decipher cryptic instructions for videoconference preparation. Consequently, when creating teacher materials, a provider should consider the amount of materials, whether they are written clearly and concisely, and whether they look professional as well as exciting. Bell appreciates materials like those offered by the Bronx Zoo for its "Awesome Adaptations" videoconference. "The

materials provide excellent background information and are easy for both teachers and students to understand. The pre-activity is effective because it demonstrates the concept of adaptation simply.”



Providers like the National Baseball Hall of Fame have put teacher materials online.

Teachers also like the Bronx Zoo’s materials because they are professionally organized in a binder. According to Lepselter, “Teachers seem to pay more attention to the materials when they’re presented that way.” She also likes receiving the hard copy as opposed to an electronic version. “If things need to be duplicated, downloading adds one more step.”

Obviously, delivery methods will affect the presentation of the materials. Many providers send teacher packets through the postal system, via fax, or by email as an attachment. However, all three of these methods can be problematic. If the materials are sent via snail mail a week or so before the connection, teachers may be hard-pressed to get the pre-visit activity done because of curriculum demands and various interruptions, such as vacations, assessments and assemblies. In addition, teachers often don’t receive the materials mailed or faxed weeks ahead when they are addressed to tech coordinators. Finally, even email attachments are mysteriously lost in transit.

Since preparation is so important to the successful videoconference, providers are starting to put their materials online. Online materials enable teachers to download materials right away and generate extra copies as needed. Teachers can also be selective, downloading only what they need. Recommended web resources can be linked to the online materials, making it a snap for teachers to search them. Besides, as Lesser points out, “When you’re doing everything—booking, billing, presenting—it’s just easier to have them readily available online.”

However, some providers prefer not to share their materials with anyone who hasn’t booked a videoconference with them. They hide the link to their teacher materials until a program is scheduled. If the provider makes a point of sending the online link with the program confirmation, then receivers should have access to materials when they need them. But remember: Materials are a great marketing tool. If they’re hidden, they can’t help sell your videoconference.

Reality check

To paraphrase the famous movie line, “If you create materials, they will come.” Teacher materials make your videoconference programs more attractive to schools. “The best videoconference lesson includes pre- and post-visit activities,” Maria Fico, Regional Instructional Technology Specialist for Region One in New York City, states emphatically.

However, we’d be remiss if we didn’t note that materials don’t always produce the desired results. Presenters are disappointed when materials needed for the videoconference lesson aren’t duplicated or prepared by teachers. By the same token, receivers are disappointed when the presenter doesn’t follow the videoconference lesson outline or fails to use materials the class spent time preparing. “In two or three cases, teachers were asked to prepare several things to be used during the presentations,” reports Bell. “However, very few or none of the prepared materials were actually used by the presenter.” In one case, Bell asked the provider to refund her money or repeat the lesson. “Time limitations are understandable, but the difficulties in these cases were due to other causes.” Hopefully, as providers and receivers become more experienced with videoconferencing, these problems will occur less often.

Just as the videoconferencing technology continues to evolve, so should program materials. The best materials are those that are reviewed and revised on a regular basis. Teacher and student feedback are invaluable in this fine-tuning process. This year, the Buffalo Zoo intends to align its videoconferences to New York State Standards, and materials that were previously sent to schools will now be available online. “There’s always room for improvement,” concludes Balk. ■

A Checklist for Class Collaborations

Planning collaborations takes time and effort, but it's worth it

By Susan Neale

How many times have teachers heard a student say, “Why do I have to learn this?” Teachers struggle to combat this frequent lament by looking for ways to motivate and give purpose to learning. They organize long distance pen pals to motivate writing, simulate an African marketplace to experience another culture, turn the gym into a science fair, create a wall mural for the school lobby, or bus students to another school for a legal debate—to name but a few strategies. Teachers have also embraced videoconferencing as a means for motivating students and providing relevance. The real-time interaction with content providers—either an expert or an educational site with a unique collection—excites students about new topics and gives meaning to topics they’re learning about. Equally valuable are the videoconferences that put two or more classes together for lively interaction.

The class-to-class connection is worth considering for several reasons. First, it provides unique learning experiences. Consider the 12 suburban classes on Long Island that were paired with 12 rural Texas classes for a pen pal and videoconference project. Or the Scottish school that connected with a New York City school to talk about fire prevention after 9/11. These projects wouldn’t have happened without videoconferencing. Secondly, students have an active role in these connections. Whether the connection is a simple “getting to know you” interaction or a highly orchestrated jigsaw-type instructional activity, where each connected class teaches the others a piece of lesson, the students are in charge of their learning. Thirdly, except for ISDN line charges, class collaborations are free. And lastly, teachers report that class collaborations are a

wonderful way for students to share their pride in their class accomplishments, school and community.

Concerned about the time and effort that goes into even a simple “getting to know you” connection? You should be. There is no getting around the fact that class collaborations are more work to plan and execute than a connection for a provider-directed lesson. However, teachers who’ve participated in class collaborations report that these enriching experiences are worth the trouble. And once the collaborative lesson is designed and a bond between the teachers has been established, the experience can be replicated or can inspire future collaborations.

Nothing that can be said in this article will eliminate the work involved in class collaborations, but the following checklist of considerations when planning a class-to-class experience will help teachers get started.

Start with an idea

To plan a successful class-to-class videoconference, teachers must give up all thoughts of being a “passive receiver” and start to think like an “active sender.” In most class collaborations, the teacher’s responsibility is no longer just to prepare students for an active role during a lesson led by the “far end.” As the name suggests, a connection between classes requires the collaboration of both teachers and students in both the planning and implementation of the lesson.

Most planning for a collaborative experience begins with an idea. For example, a teacher might think: “What if I could find a class willing to write to my class about the books we’re reading and then videoconference with us as a culminating activity?” Or, “What if I could find a class near fresh water

wetlands that would videoconference with my students, who have been investigating our area's salt water wetlands?" A teacher might pick a curriculum topic and then look for a distant location that can offer an exciting learning experience on the topic. Suppose, for instance, the class is studying American Industrialization; the teacher might want to connect with a class situated near the Erie Canal. A French teacher might want to connect with a class in Paris, France. In these scenarios, the teacher must then ask, "What can my students offer the distant class in return?"

Often, the minute the teacher gets an idea for a collaborative videoconference, his or her mind begins to race with thoughts about how to execute it. It's a good idea to jot down all ideas about a possible project, but it's best not to spend too much time developing a lesson before you've found a class to collaborate with. Ultimately, the lesson must be designed to be a mutually valuable experience. The collaborating teacher is bound to have ideas about the lesson's scope and sequence. Additionally, the joint planning may have to take into account such things as the different time zone and school bell schedule, state standards, and even cultures.

Location, location, location

Before a teacher starts looking for a class, it's a good idea to narrow down the geographic choices. The topic and/or objectives for the collaboration usually dictate where you will connect. For example, if the lesson is about your state's history, geography and culture, you'll probably want to connect with another class in your own state. If you want to discuss different weather conditions across the United States, you'll want to connect with classes in different states. On the other hand, even if your primary objective is to have a book chat, you may choose a class along the East or West coast if your class is, say, in a desert area, since environmental and perhaps cultural differences can make for a more lively interaction. Many rural communities are anxious to connect with inner city schools for this reason. And everyone seems to want to connect with Australia and Japan.

Your time zone is an important consideration and should be dealt with early in the process. If an East Coast class wants to connect with a West Coast class, but can only have access to the school's videoconference equipment in the morning, the three-hour time difference is going to limit a connection to the hour between 11 AM and noon

Web Resources

Websites for Finding Collaborative Partners

- **Global Leap**

<http://www.global-leap.com/>

Global Leap has a directory of international schools with videoconference capabilities. The organization also arranges multipoint events between schools around the world and content providers. The website describes upcoming events and how to get involved. There are also case studies of past events.

- **NOECA Classmates**

<http://fmpx.noeca.net/classmates/index.php>

At this site, you can register your collaborative project interests and search for classes around the world.

- **SBC Directory**

<http://www.kn.pacbell.com/wired/vidconf/directory.cfm>

You can search by state or country to find locations with videoconferencing capability.

Sampling of Past Collaborative Lessons

- **SBC Listserv Archive**

<http://www.kn.pacbell.com/wired/vidconf/ed1vidconf.html>

Looking for collaboration ideas? Check out SBC archive of listserv messages from schools wishing to collaborate with another school.

EST (that's assuming the West Coast can connect at 8 AM PT). And just for the record: When it's 8:30 AM in New York, it's 10:30 PM in Japan. So, before you get too excited about connecting with Osaka, consider your class schedule, the availability of your videoconference unit, and whether a connection is feasible for the Japanese class.

As might be expected, finding a class to collaborate with is harder than finding a content provider. There are a few online directories of schools with videoconferencing capability in and outside the United States, but keeping the information current, especially email contacts, seems impossible. Online organizations with directories are included with this article, but beware of out-of-date information. EEZ members can post a request to videoconference with another class on the EEZ Online Community in Caucus. The SBC Collaboration Collage listserv posts subscribers' requests for class-to-class collaborations several times each month. Potential collaborators can become subscribers to the listserv and post their requests by signing up on the SBC Education website (see *Web Resources* on p. 59).

Hopefully, you'll find a class without too much trouble. At that point, it's easy to be swept up in the excitement, knowing you're going to give your students a unique opportunity. You may want to finalize a lesson plan with the collaborating teacher right away, but you must resist the planning phase just a little longer. Before serious collaborative brainstorming ensues, do a test connection with the other class. It's important to know that each class's videoconference equipment, software and transmission methods are compatible, before you invest more time.

Some videoconference users have found that different types of equipment don't like to "talk to each other." And with so many different transmission choices (ie, ISDN, global Internet, Internet2 and statewide networks), connection glitches are a reality. If classes using different transmission methods want to connect, they will have to arrange to use a bridge. Even two IP sites will have problems, if they both have firewall software that doesn't allow incoming calls. They'll have to dial into a bridge, too. International calls have been known to be troublesome; there are all sorts of speculation as to why, which this article won't go into. Sometimes, little adjustments, like using a bridge, changing the connection speed or scheduling a different time of day for the connection, can make a connection possible. The point: Make sure you have

a good connection before you start organizing for a very exciting, interactive collaboration.

Planning phase

Once compatibility is assured, you can begin to design the lesson. The lesson is not only a wonderful way for teachers to collaborate, but it's also a great way to put students in charge of their learning. The success of the collaboration rests largely on the students taking responsibility for the event. Here are a few considerations:

Script

Seasoned class collaborators highly recommend writing a script for the connection. Think of the collaboration as a television production. What's going to be the format for the connection—a game show, a news broadcast? Will each class make a short presentation followed by a session for questions and answers? Each activity and the time required for it should be blocked out. With a script, you won't waste a second of your precious connection time, wondering what's supposed to happen next.

As with provider connections, the grade level will dictate how long and involved the script is. Grade level, however, doesn't determine the success of the interaction. For example, first graders have successfully participated in "Read Across America," reading and discussing their favorite books.

If you're nervous about structuring a class-to-class collaboration, especially a multipoint connection, consider signing up with one of the many established collaborative projects offered on the web. With these class-to-class connections, the lesson planning is already done for teachers. Once you've experienced someone else's collaborative project, you'll have a better sense of what works and what doesn't. For a sampling of these projects, see the list of *Collaborative Projects* on p. 62.

Activities

As with any lesson, it's good to incorporate a mix of activities, such as student presentations and small group, hands-on activities. Other ideas include role playing, games, student-to-student interviews, and collaborative writing. Some classes have even led the far end class in very physical activities, such as dance steps. However, if you are using IP transmission, it's best to avoid anything that requires a lot of movement.

Equipment and materials

Make a list of the peripheral equipment and materials needed to execute the lesson's activities. Lesson ideas may have to be tweaked because one class doesn't have access to certain equipment (ie, computer, VCR/DVD, document camera). If a class wants to show one-dimensional items, such as photographs or art reproductions, but doesn't have a document camera at its disposal, try propping enlarged pieces on an easel. If a number of prints are going to be shown this way, create a camera-position preset for the easel.



Bronx, NY, schools collaborate on an annual poetry slam project.

Visuals

As you know, videoconferencing is a visual medium. The collaborative lesson should include lots of visuals, such as photographs, PowerPoints, video clips, graphs, three-dimensional objects and so forth. Maps showing where each class is located should be part of the "ice breaker" at the start of the connection. Before the event, the two teachers should do a test connection to see if each planned visual is legible across IP or ISDN lines. For example, visuals using a small font or light colors might not be perfectly clear to the far end viewers. Video clips will probably not transmit well at the lower speeds.

Pre- and post-visit materials

As with provider connections, it's important for students to be prepared for the class collaboration. Preparation will mean different things depending on the nature of the collaboration. For example, if a discussion or debate is planned, the students will need to be well versed on the topic. Each side must consider their part of the presentation and what the far side will need to know to ensure a lively interaction. For instance, a class might want to send a vocabulary list or related web links to the other class for pre-

event preparation. If each class is going to teach part of a lesson, preparation should include rehearsing the lesson before the connection.

Regardless of the lesson design, the students must be ready to both listen and interact. Videoconferences are a wonderful opportunity for students to hone their speaking and listening skills, but students need to understand their new interactive role. (Remember: Up until now, television has been a "passive" experience for students.) Whether your students are connecting with students in another state or another country, they are representing their school. They need to understand what is and isn't appropriate behavior (and language). If the project is the class's first collaborative videoconference, it's not a bad idea to do a "practice connection" within your district. It's also helpful for students to brainstorm some questions to ask the other class before the actual connection.

Considering all the hard work that went into planning the connection, it would be a shame for the association to end after a single event. Why not have the students create something that can either be mailed to the distant school or that can be shown during a follow-up videoconference? Some teachers design projects with several videoconferences over the school year. According to a French language teacher who connects her high school students with Parisian students several times a year, the students are more comfortable and more articulate in the subsequent videoconferences.

Timetable

Setting up a class-to-class connection always takes time. As a rule of thumb, you should allow at least two months from the time you decide to do a collaborative project to the actual point-to-point event. This holds for collaborative videoconferences with two classes both in and outside the United States.

Multipoint collaborations—that is, more than two classes connecting at the same time will probably require more planning time. A different time zone might not be hard to work with when planning a connection with one other US class, but the minute you try to arrange a project with several



schools in three time zones, things get challenging. Add to that the different equipment and transmission methods, plus assessments, vacations and bell schedules and you'll probably need an Excel spreadsheet to keep everything straight. It's a good idea to designate one teacher as the "lead site" to coordinate with the other sites.

While some of the strongest support for the collaborative projects comes from schools in isolated communities, these videoconferences benefit students in every type of community. Class collaborations offer endless videoconferencing possibilities across the curriculum. Their design is only limited by one's imagination. However, in light of the work that goes into the planning, it's a good idea to make your first collaboration a simple lesson for a point-to-point connection.

Acknowledgements

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Collaborative Projects

• Global Nomads Group

<http://www.gng.org>

GNG organizes huge international events, such as the two connections with Iraqi high school students in 2004. You can get on their email list to be notified of upcoming events.

• iEARN

<http://www.iearn.org/projects/index.html>

Want to get those collaborative juices flowing? Check out this site, which offers a huge list of ongoing collaborative projects.

• MysteryQuest

Fifth grade: <http://www.remc11.k12.mi.us/dl/MQUSA/>

Sixth-Eight grades: <http://www.remc11.k12.mi.us/dl/MysteryQuest/index.html>

This is a US geography lesson. Students create a presentation about a "mystery" location. The website offers pre-event materials and web links.

• NASA's Science Through ARTs

<http://nasadln.nmsu.edu/dln/content/catalog/details/?cid=78>

Science Through Arts (STAR) is a year-long project, during which students connect with NASA scientists and engineers, members of the Cleveland Museum of Art, a published science fiction author, scientists at the Adler Planetarium as well as other classes. Learning science and then expressing that understanding in an art project is one of the primary goals of the exciting program.

• Math Motivators

<http://www.motivate.maths.org/>

Math Motivators is a British organization offering videoconferences with professional mathematicians. These are multipoint connections for British classes, but if they have a port available, they accept American classes.

• Read Across America

<http://www.twice.cc/read/index.html>

Each year, schools across the country connect during the first week of March to celebrate reading and Dr. Seuss's birthday. Classes register and are matched with a distant class. This is a great way to meet another class and get your "feet wet" with class-to-class videoconferencing.

• SBC Education Collaboration Collage Listserv

<http://www.kn.pacbell.com/wired/vidconf/ed1vidconf.html>

Subscribers can post and receive messages about class-to-class collaborations.

• TWICE

<http://www.twice.cc/projects.html>

This is a listing of videoconferencing collaborative projects.

Let's Make a Date: Best Scheduling Practices for Content Providers

Avoid booking mayhem with scheduling policies and tools

By Linda C. Unger

How do content providers handle their bookings? The short answer: The best they can. In many cases, the person responsible for scheduling a videoconference is the same person teaching the programs, troubleshooting connection glitches, preparing teacher materials, and tending to the bookkeeping. Some content providers teach as many as seven videoconferences a day, while others straddle both virtual lessons and onsite lessons. To make matters worse, the location of the distance learning studio often isn't in close proximity to the office. If an educational site is just beginning to offer videoconferences to receivers and bookings are relatively few and far between, the multi-tasking provider may be able to juggle it all. But as program bookings increase, the balancing act can quickly turn into a nightmare. The lucky few are given a support staff to help with booking and other paperwork or, perhaps, an intern during the busiest scheduling months. If you're not one of the lucky ones, the next best defenses against booking mayhem are to develop a scheduling policy and a tracking system.

Reach out

When developing a scheduling policy, one of the first decisions a provider needs to make is how—by what method of communication—will reservations be accepted. You'd think in this day of high-end communications that it would be a piece of cake for content providers and receivers to contact each other to schedule a videoconference, right? Well, think again. Like the providers who can't answer phone calls because they're off teaching a videoconference

lesson, the receivers trying to schedule a program are often teachers who have extremely limited access to phones because they're teaching in the classroom.

Nevertheless, some providers continue to make a policy of accepting telephone reservations. Tracy Grosner, School and Teacher Program Coordinator for the Albany Institute of History and Art, remarks, "I prefer to be contacted via phone to schedule because it is a more timely process. I can connect with a school and schedule a program immediately."

The frustration of "telephone tag," however, has led other providers to rely on email, a method of communication that can be conducted after the instructional day for both the providers and receivers. But as Grosner points out, "With email, sometimes the process is so long that dates and times requested fill up during the back and forth communication process." Consider this scenario: The receiver emails a date and time for a program, but the provider doesn't have the time available. The provider emails an alternative, but can't "hold" the time for the receiver without a commitment. By the time the receiver writes back, the new time has been given to another receiver. To help remedy this situation, many content providers ask schools to give two or three possible dates and times in their initial email.

More and more, providers are posting registration forms on their websites for receivers to submit online or to download and fax. The Cleveland Museum of Art (CMA), which doesn't accept any phone reservations, has taken online booking a step further. In addition to the online registration form,

says Lenaia Burbank, Distance Learning Scheduler, “there is an online calendar that enables schools to look at the studio’s schedule.” In other words, schools can see what time slots are available in each of the museum’s two DL studios when they fill out the registration form. Unfortunately, the calendar isn’t updated automatically. Manual updating is done every Monday as a general rule. However, at peak times of the school year, when the staff is super-busy, the calendar may fall behind a bit. Occasionally, the museum has to respond that a date is unavailable. Since the form asks for a choice of dates, the school can usually be accommodated.

Registration forms ensure that all the pertinent information is gathered at the outset. This avoids confusion later on, such as missed connections because the school wasn’t clear about time zone differences. One of the advantages of online registration is that the form can be set up so it won’t allow submission unless all pertinent information is provided.

Besides the obvious information, such as the lesson title and preferred dates and times, registration forms may ask how the school intends to connect with the museum. Providers who don’t have both IP and ISDN capabilities need this information. To connect with CMA, out-of-state receivers with ISDN capabilities must use a bridge. If the information is on the registration form, it gives Burbank enough time to schedule the bridge. If an educational site doesn’t have access to a bridge, the provider can respond quickly, letting the receiver know a connection isn’t possible.

Any number of housekeeping details may be gathered on the registration forms. Often the forms evolve as providers connect with more schools. The CMA recently revised its form to include a requested end time for scheduled programs. Museum educators appreciate knowing in advance if a school must disconnect at a particular time. The revised form also enables schools to indicate whether they are booking through a consortium. Since the CMA discounts fees for certain consortiums, this is important for billing purposes. And speaking of billing, most registration forms require detailed billing information before a program confirmation is sent to the receiver.

Timing is everything

Not surprisingly, time is an important consideration when drawing up your scheduling policy. For example, when will you teach the programs?

Content providers generally reserve the hours that represent a normal school day in their own time zone. Conducting test connections and related business at other times enables them to reach as many schools as possible, while making their own time manageable. “Our regular hours for lessons are 8 AM to 3 PM EST,” says Burbank. “However, we do have lessons after 3:00 EST, if a school wants a teacher workshop or they are on a different time zone.”

Your policy should also explain how much

Registration Forms 101

Want to create an online registration form, but don’t know what it should look like? You can begin your education by looking at the online registration forms of several EEZ providers.

Bronx Zoo

http://bronxzoo.com/media/file/05-06_RegistrationForm.pdf

Cleveland Museum of Art

<http://www.clemusart.com/educf/distance/form.asp>

Philadelphia Museum of Art

<http://www.philamuseum.org/education/distance-requestforms.html>

“lead time” is required for scheduling a program. Some content providers require four weeks advance notice, while others accept as little as two. A few will do a program the following day, if they have an opening. When choosing a policy for your site, there are a few things to consider. For example, how much time do you have available to schedule a test connection? A provider delivering seven videoconferences a day may find it hard to do a required test connect on short notice. If your teacher materials aren’t online, how long will it take the teacher to receive your materials? And once the teacher has the materials, how long will it probably take him or her to prepare the class? Depending on the provider, the list may go on. While the Manhattan School of Music doesn’t have any formal policy about advance bookings, Christianne Orto, Assistant Dean of Distance Learning, notes

that the site has “a more elaborate system of sound checks and testing prior to our presentation day” and prefers as much advance notice as possible.

You’ll get high marks with receivers if you have a policy about your response time to program requests. Even seasoned receivers, who know how busy popular providers are, don’t want to be left hanging, wondering if their email request or online registration was actually received. If you can’t respond with a confirmed booking within 48 hours, you should send out an email stating that the request is being processed and that a confirmation or alternative dates will be sent out shortly. And it’s not a bad idea to define “shortly.” If it generally takes a week to 10 days to book a program, tell the receivers.

Devising a policy for rescheduling failed connections is more complex. Obviously, test connections prior to the event can help prevent failures, which is why most content providers require them. However, technical trouble can still occur despite a successful test. In general, content providers do their best to accommodate a school when a connection has failed or been cancelled, but each has slightly different policies as to the circumstances. Some require additional payment if the failure or cancellation was clearly attributable to the school, but will reschedule free of charge if the fault was with the museum or when a school has had a “snow day.”

Rescheduled videoconferences generally have to be booked when there is time available for both parties, since most content providers can’t afford to hold slots open for re-doing failed connections. Usually, with a bit of cooperation, it is not too difficult to find a mutually agreeable time slot, although this is more challenging during busy seasons, such as the mid-fall and late spring. The key is flexibility, both on the part of the school and the content provider. Some content providers even go so far as to give schools a “credit” for the following school year, if they aren’t available at a time that works for the school.

Keeping track

Many content providers keep an old-fashioned paper calendar where the program, teacher and time are recorded. Most use a reservations sheet where additional information, such as time zone and phone number in the school’s DL studio, are included so they are handy on the day of the connection.

In general, providers enter their bookings in either a calendar software program or an Excel spreadsheet. This not only helps prevent conflicts, but also enables the content provider to generate statistics at the end of the school year. Data such as the number of videoconferences held, the zip codes of schools reached, the number of students participating, and the amount of revenue generated are all important for gauging the relative health of a content provider’s DL program.

With their online registration and studio calendar, it’s not surprising that Cleveland Museum of Art also does its tracking electronically. “We have a scheduling program that was designed by one of our employees and is used by the entire museum,” explains Burbank. “This program allows the studio to print out the daily/weekly schedule of lessons. This also allows us to get stats on the year.”



Buffalo Zoo uses an Excel spreadsheet to track registrations and create reports.

Making your policies known

Hopefully, with a scheduling policy devised and a tracking system in place, booking videoconferences won’t seem so daunting. Creating policies and tracking tools should help you organize your day and help to streamline the booking process. Also, answering receiver questions is easier when you’ve got policies and a tracking system.

Receivers appreciate clear-cut policies as well, so don’t forget to share yours. You’ll have to decide what information to include on your website and/or in your teacher materials. Obviously, policies about booking—how to make a request and when to expect a response—should go on the website. Other policies that will affect the activities leading up to, during and after a booked event might be included in the teacher materials. ■

Videoconferencing on a Budget

With creative thinking and planning, the “show” can go on

By Susan Neale

When it comes to videoconferencing on a budget, there's good news and there's, well, not so good news. The best news is that the cost of videoconference equipment and connections has decreased dramatically over the past five years. Improved Internet Protocol (IP) can claim much of the credit for this. It's less expensive to transmit over the Internet than over multiple ISDN telephone lines, and there are some very affordable IP-capable equipment options. School district business offices are pleased with the savings and teachers appreciate the mobility of IP. In fact, a strong case could be made for IP's role in the record number of connections reported during the 2004-05 school year.

The other good news is that the number of high-quality videoconference programs continues to grow. Providers have gotten the message about “no talking heads” and are developing highly visual, highly interactive lessons. With careful program selection, schools are likely to have engaging connections and feel satisfied that their money was well spent.

But here's the irony: Although grants exist to purchase equipment and there are lots of good quality programs to choose from, receivers regularly complain that there is little or no money for booking videoconference lessons. Meanwhile, providers are raising program prices, partly to offset the cost of new technologies and tech support they've added to make their videoconference lessons more dynamic. As a result, school videoconference equipment often collects dust in the library media center, computer lab or utility closet.

Fortunately, it's not all bad news. Some

connections are still free or at least modestly priced. For receivers who are willing to do a little creative thinking and planning, the “no budget” scenario doesn't have to be a “show stopper.”

The hunt for low-cost programs

Five years ago, a number of world-class educational sites were offering programs for free or under \$75, thanks to grants that allowed providers to develop videoconferencing programs and offer them at affordable prices. However, the number of no- or low-cost programs has dwindled since then. Consequently, finding them may take a little detective work. Here are some of the places to look.

Online videoconferencing directories

Online directories offer “one-stop shopping” for videoconferences. Program titles are presented, along with descriptions, contact information, fees, technology requirements and so forth. Generally speaking, these directories are user-friendly and can be searched by content area, provider name and/or grade level. The EEZ online videoconferencing directory (see *Directories of Videoconference Programs* on p. 69) can also be searched by NYS Learning Standards.

The TWICE directory allows users to search by program cost. At press time, the TWICE directory listed 253 free videoconference programs. Use “less than or equal to \$100” as your search criterion, and the database comes up with 596 choices. This is very impressive, but unfortunately, not entirely accurate. Which brings us to an important point: Videoconference directories are a great way to tap

into lots of programs by a variety of providers, but they aren't always maintained as well as individual provider sites. Don't get excited about what you find until you've contacted the program's provider to confirm the information.

Videoconference listservs

The listserv, an automatic email server, is another great resource for free and discounted programs. Regional education organizations often use a listserv to encourage discussion of education-related topics. A videoconference listserv can provide valuable information about education opportunities and videoconference user experiences. Whether or not you already subscribe to a local videoconferencing listserv, you should consider signing up with the SBC listserv, an international email server for providers and receivers. Providers post information about new programs, special events, and free opportunities. Receivers post messages when they are looking for class collaborations, professional development opportunities and expert programs on specific topics. The SBC listserv also sends out information about upcoming technology conferences.

Several years ago, an elementary school librarian in Long Island, New York arranged a videoconferencing connection for no less than three sections of every grade level, K through 6, at a total cost of only \$900.00. She did it without doubling up any of the classes. It's true that there were more "free" and "under \$75" programs back then, but many of the connections she arranged, such as the popular "Read Across America" program, were found on the SBC listserv.

Cheaper by the dozen

Whether you found a program in an online directory, the provider's website or some other resource, you should always verify the price. Obviously, prices change, but the change might be in your favor. It's not unusual for content providers to get grant funding that enables them to lower program prices, or even offer them for free, for a limited time. In addition, prices aren't always carved in stone. Some receivers have found that providers are willing to negotiate program costs. There's no harm in trying, but keep in mind that many educational sites rely on grant funding just to keep running; their "full" prices don't cover the cost of their programs.

Providers are known, however, for creating cost-saving opportunities to attract new receivers or increase bookings. For example, some providers will offer substantial discounts for multiple bookings. Other providers have offered discounts for programs booked in September and October, traditionally slow months for videoconferencing.

Additionally, new videoconference lessons are always being developed and they require piloting. Providers will often offer a lesson in development for free in exchange for a written critique. You might want to contact providers (especially the expensive ones) and let them know you're available to pilot new programs.

What could be better than an arrangement that saves money for both the provider and the receiver?

Some providers also give a price break for shortened programs. This is particularly good news for primary grade teachers, who know their students' attention is apt to wane if a connection runs longer than 30 minutes. And while high school students have the needed attention span, their school's bell schedule may prevent reception of a full-length videoconference lesson. Again, a quick email or phone call could yield a savings.

Provider-receiver partnerships

What could be better than an arrangement that saves money for both the provider and the receiver? Texas Region 14 and The Grace Museum in Abilene, TX, have just such a win-win relationship. According to Tommy Bearden, Distance Learning Coordinator for Region 14, the museum needed a network to transmit its videoconference programs. Region 14 agreed to give the museum access to its network. In return, Grace Museum doesn't charge for videoconference lessons delivered to Region 14 schools. It's worth asking yourself: "What might my campus or district offer to a provider?"

Class collaborations

Class collaborations are always the right price—free. Seasoned receivers report that class-to-class connections have been some of their most rewarding videoconference experiences. In a recent

collaboration with the Queens (NY) Borough Public Library, Queens Children’s Psychiatric Center, and the Henry Viscardi School on Long Island, students read *October Sky*, saw the movie version and submitted questions to author and NASA rocket scientist Homer Hickam. The students participated in several class-to-class connections, culminating in a connection with the famous scientist. According to Kenneth Peters, EdD, Director of Education at the Psychiatric Center, it was a wonderful opportunity for everyone involved. “When one of the physically disabled students from the Henry Viscardi School asked a question that was barely audible and Mr. Hickam said, ‘That’s a good question,’ our eyes filled with tears of joy.”

It’s a big country and lots of people are videoconferencing.

It’s true these events are more work (see *A Checklist for Class Collaborations*, p. 58) than provider lessons, but once you’ve developed a rapport with a distant class, you can arrange other connections year after year. As mentioned earlier, the SBC listserv regularly posts messages from receivers who are seeking classes in all content areas for collaborative learning experiences. It’s a big country and lots of people are videoconferencing; you shouldn’t have too much trouble finding another class to pair up with.

Crowd control

By now, everyone agrees that videoconference lessons are most successful when there’s a sense of intimacy between the provider and the class. The smaller the class size, the greater the chance that students’ questions are asked and answered, and that students stay engaged. Still, if you have a limited videoconference budget, you might consider “pushing the envelope” a little by increasing the class size or signing up for multipoint connections. Here are some of the pros and cons of each.

Doubling-up classes

While most providers frown on the practice of doubling-up classes for a videoconference program

(some will apply a surcharge for each student over a certain limit), there are providers who don’t care how many students show up for a connection. However, when 40 or more children are sitting in front of a television or projector screen, it’s more or less guaranteed that only the first two rows of students will interact with the presenter on the far end.

Still, there may be occasions when the benefits—price and/or program content—outweigh the disadvantages. The benefits recently compelled a New York elementary school to double-up classes for a connection with a Mexico City school. The American students had conducted extensive research on Latin America in the classroom and library. What better way to make the unit really memorable than to give the children an opportunity to videoconference with Latin American children? Although the collaboration would be free, the American school had five fifth grade classes, while the Mexico City school had only one class fluent enough in English to sustain an interaction. It was decided that the Mexican students would videoconference twice and the American grade level would be split into two groups of 60 students each. As expected, most of the interaction was between the Mexican students and the American students sitting closest to the camera. Still, all the students had an experience they wouldn’t have had otherwise.

Multipoint connections

Multipoint connections come in two “flavors”—interactive and view-only (the latter sometimes referred to as lurking). As these terms suggest, interactive participants can ask questions of the presenter, while view-only participants can only watch the program. Generally speaking, when there are several interactive sites, each will incur a fee less than the average point-to-point connection. View-only sites will receive an even greater discount. Even though you sacrifice interactivity and scheduling flexibility (the provider determines the date and time for such events), multipoint connections can offer unique opportunities, such as virtually meeting a well-known author or political figure.

It’s important, however, to know how the multipoint event is going to be facilitated before signing up. The truth is that some multipoint events are structured so poorly, they aren’t worth doing at any price. On the positive side, some providers offer multipoint connections for all their programs, so that schools on a budget can participate. The provider

accepts the first receiver request for a time slot as the interactive site (usually at the full lesson price) and all others as view-only (at a discount). In this scenario, the structure of the lesson is similar to a point-to-point lesson, though only the one interactive class communicates with the presenter. Hopefully, the interaction will be lively enough to hold the interest of the view-only sites.

Problems sometime arise when providers arrange special events with multiple interactive and view-only sites. If you are thinking about signing up for one of these events, find out how many other interactive sites will be connected. If there are more than three classes, there won't be much time for each class to ask questions. In addition, get as much information as possible about the lesson design. When the event is an opportunity to meet someone with a special talent or career, some providers ask the speaker to address the students for 40 minutes before he or she takes the first student question. Shame on those providers! If the students need "background" information on the topic or guest speaker, the provider should send it to the teacher prior to the event, so that the speaker-students interaction can begin no more than five minutes into the videoconference.

Multipoint connections can be rewarding, though, even if your school is not on a budget. Often these events involve rather famous people who couldn't feasibly connect point-to-point with

individual classes. Just be sure your students understand that this won't be a highly interactive session. Also, try to supplement these connections with more interactive class-to-class collaborations that extend the learning.

Finding funds

Teachers have been known to collect money from each student for a virtual field trip or videoconference, just as they would for a real field trip. If that's not something you're ready to consider, here are a couple of other fund raising ideas.

Local funding

Content receivers report that it's possible to get funding for videoconferences from local sources, such as the Lion's Club and the Rotary Club. Parent-Teacher Associations have been known to support videoconferencing with funds for both equipment and programs. To rally support, arrange a videoconferencing connection during "Back to School" night. If you are on the East Coast, you may be able to book an early evening connection with a West Coast provider. Invite parents and representatives of community clubs to attend the videoconference. Most people have to see a live videoconference to really appreciate the educational potential.

Directories of Videoconference Programs

The following online resources may offer leads to low-cost and free videoconference opportunities. However, beware of outdated information. The videoconferencing landscape is constantly changing—programs regularly disappear, new programs take their place and prices go up. Before you get excited, verify the information directly with the content provider.

- **EEZ Database**—Descriptions of programs offered by EEZ members
<http://eeznt2.nyiteez.org/Videoconferencing/default.asp>
- **Noodle Trips**—A search engine for finding virtual field trips
<http://www.noodletrip.com/>
- **SBC Videoconference Adventures**—Descriptions of videoconferencing sites with contact information. Sign up for the SBC listserv here
<http://www.kn.pacbell.com/wired/vidconf/adventures.html>
- **TWICE Field Trip Database**—Scroll down and click on "field trip database"
<http://www.twice.cc/fieldtrips.html>

School as provider

Have you heard about Stamford High School in Stamford, TX? The school is a content provider. A couple of years ago, a Stamford teacher and her students developed a videoconference about cotton. Located in the Cotton Belt, the school-provider sends a box of cotton bolls (yes, bolls right from the plant) to distant schools for a hands-on experience during the connection. The money raised from the program's modest fee is intended for the purchase of new videoconference equipment. For more about this program, visit <http://www2.stamford.esc14.net:1090/>.

Who is your champion?

Think teachers have time to search the Internet for low-cost programs, find distant classes for collaborations, negotiate program fees with providers, and solicit funding from the PTA? Think again. Without a dedicated videoconference coordinator, it's unlikely that videoconferencing on a budget will thrive.



Collaborations, like the Bronx poetry slam, are free.

If teachers have carte blanche when choosing programs, they shouldn't have too much trouble finding and integrating videoconferences into their curriculum. But if they are expected to find only free or low-cost programs, they need a champion, someone to be their "eyes and ears" on videoconferencing. A videoconferencing coordinator provides the support—tracking cost-saving programs as well as technology advances—necessary to ensure

the continued use of the technology.

It makes sense to have a coordinator, even in a building or district that doesn't have to hunt for bargains. Why make each teacher comb the Internet for programs and special events? With one person disseminating videoconference information to the building or district (depending on size), it saves time for everyone else. Besides, a coordinator can collect feedback from teachers who've made connections and share it with the rest of the faculty. Moreover, a coordinator can help with technical problems, decreasing the number of aborted connections. Even the most enthusiastic teacher can feel stymied by the occasional technical challenges presented by a multipoint or class-to-class connection.

Needless to say, important characteristics of a coordinator are a willingness to learn about the technology and the time and enthusiasm for sharing videoconferencing news with others. Often, a school's computer teacher or media-library specialist is designated as the videoconferencing coordinator because of his or her technology background. In addition, the library or computer lab offers a centralized location for storing equipment between connections. (The videoconference coordinator also keeps track of the videoconference unit's availability.)

In the best cases, VC coordinators confer regularly with their counterparts at other schools in the district to share information. Even without a coordinator, educators can join a videoconferencing listserv or a distance learning organization. Videoconferencing, especially on a budget, seems to function best when people are regularly sharing ideas, news and experiences.

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Kenneth Peters, EdD, Director of Education, Queens Children's Psychiatric Center, Queens, NY ■

More Math Videoconferences

Bronx teachers and EEZ providers to develop new lessons

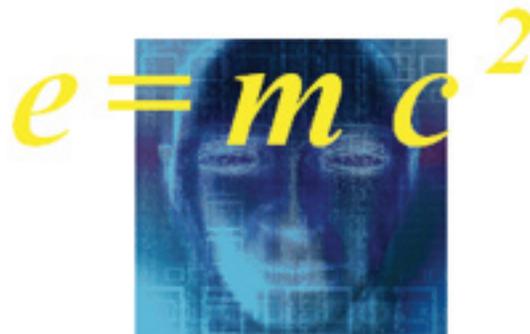
What do pizza, fruit sticks and egg salad have in common? They're tasty foods for teaching fraction skills! In January, the Culinary Arts Center at NYIT partnered with PS 54 in the Bronx to create three videoconference lessons on fractions for fourth grade students. The lessons were developed through a New York State Title IID grant, $e=mc^2$ (excellence is yielded in mathematics through collaboration and creativity) and a Title IIB Math Science Partnership grant, Digital Immigration, which were awarded to Superintendent Yvonne Torres and New York City Region One (NYCR1). The EEZ is a partner in both grants, which are designed to help Bronx mathematics teachers develop lessons to improve student academic achievements.

The grants have targeted 27 public schools and 16 non-public schools at risk in math and plan to reach up to 500 teachers. Some goals include:

- Increasing academic performance of students in mathematics
- Increasing teacher proficiency in project-based learning, and the implementation and integration of the tools of technology
- Supporting administrators to use technology to support data-driven decision making

The NYIT EEZ is assisting NYCR1 to develop a list of mathematics gaps based on GrowNet data. NYIT staff—together with targeted teachers and partnering content providers—are developing videoconference lessons that focus on these gaps for 13 targeted schools. PS 54 and the Culinary Arts Center created lessons on fractions because this is an area that needs strengthening according to the test data.

All the videoconference lessons are being created with pre- and post-videoconference activities and will be aligned to the New York State Standards down to the performance indicators. These programs will then be usable by other classes throughout the



city and across New York state.

New York City Region One and the EEZ are fortunate to have the support of several content providers, including the Culinary Arts Center at NYIT, Liberty Science Center, the Museum of Television and Radio (NY), and the Philadelphia Museum of Art, for this project. ■

Creating New Math Lessons

The EEZ is helping NYC Region One to:

- Identify gaps in student performance
- Partner targeted teachers and appropriate content providers
- Facilitate teacher/content provider collaborations to create new VC programs or modify pre-existing ones to target identified gaps

The new mathematics videoconference lessons will:

- Include pre- and post-videoconference materials
- Integrate into existing units and curriculum
- Align to the New York State Standards down to the performance indicators
- Be easily replicable in other classes

Searching the EEZ Videoconferencing Database

The Educational Enterprise Zone® Videoconferencing Database is a searchable database of member programs. The Database allows you to:

- Find quality videoconferencing programs from EEZ providers
- Evaluate the relevance of the videoconferencing programs to your curriculum
- See which New York State Learning Standards the videoconferencing programs are aligned to, on three levels in five major subject areas
- Get contact information for the providers of the videoconferencing programs for purchase and scheduling purposes
- View user-generated ratings of the videoconferencing programs
- Rate videoconferencing programs that you have used

NYIT
NEW YORK INSTITUTE
OF TECHNOLOGY

Educational Enterprise Zone® Videoconferencing Database
A Guide to Quality Interactive Videoconferences for PreK-12 Classrooms

HOME VIEW THE VC STANDARDS RATE A PROGRAM FIND A PROGRAM -Search by NYS Standards- GO

This guide will allow you to:

- Find quality videoconferencing programs from EEZ providers
- Evaluate the relevance of the videoconferencing programs to your curriculum
- See to which of the **New York State Learning Standards** the videoconferencing programs are aligned, on three levels in five major subject areas
- Get contact information for the providers of the videoconferencing programs for purchase and scheduling purposes
- View user-generated ratings of the videoconferencing programs
- Rate videoconferencing programs that you have used

Encourage the Heart
Enable the Mind

Search by Title, Subject, Grade, Keyword:
FIND A PROGRAM

Search for Aligned Programs:
-Search by NYS Standards- GO

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You can search by title, subject, grade, keyword, or by New York State Standard.

How to Search by Title, Subject, Grade and Keyword

- Go to this address: <http://www.nyiteez.org/Videoconferencing>
- Click: Find a Program
- Decide if you want to search by:
 - Provider – click on the name
 - Program Title – enter part or all of the title in the box
 - Category – click on the appropriate radio button
 - Subject Area(s) – check off as many subjects as you want by clicking once inside each box
 - Grade Level(s) – check off as many grades as you want by clicking once inside each box
 - NYS Learning Standards/Keywords – enter topical keywords or keywords from one of the learning standards
- Click: *Find Programs*

The screenshot shows a search form titled "Find a Videoconferencing Program". On the left is a blue sidebar with a cube icon and the text "Encourage the Heart Enable the Mind". The form fields are: "Provider Name" (a dropdown menu with options like "Albany Institute of History & Art", "American Labor Museum", "Bronx Zoo of the Wildlife Conservation Society", "Buffalo Museum of Science", and "Buffalo Zoological Gardens"); "Program Title" (a text input box); "Category" (radio buttons for "K-12 Programming", "Professional Development", and "Demo"); "Subject Area(s)" (checkboxes for "All", "Arts", "Math", "Social Studies", "ELA", and "Science"); "Grade Level(s)" (checkboxes for "All", "Pre-K", "Kindergarten", "1", "2", "3", "4", "5", "6", "7", "8", "9", "10", "11", and "12"); and "Search the NYS Learning Standards and aligned programs by keywords:" (a text input box).

How to Search by NYS Standard

- Go to this address: <http://www.nyiteez.org/Videoconferencing>
- Click on the subject you want to search by and click: Go
- Then, use the links on the right of each page for key ideas, performance indicators and videoconferencing programs aligned to each learning standard.
- Once you drill down, you will find a list of programs next to each Performance Indicator or Band. Click on the program you want to view.

The screenshot shows a dropdown menu titled "Search for Aligned Programs:". The menu is open, showing a search box with the text "2005 -Search by NYS Standards-" and a "GO" button. Below the search box, a list of subject areas is displayed: "Arts", "ELA", "Math", "Science", and "Social Studies".

Rating a Program

After using a program, you can complete a survey about the experience.

- Go to this address: <http://www.nyiteez.org/Videoconferencing>
- Click on the Rate a Program button on the top menu bar
- Enter the Program Code you received with your videoconferencing program
- Use the 5-star rating system to answer the questions. Add comments and submit your form. ■

RATE A PROGRAM

History and the Future

We must embrace new technologies and practices without throwing away our effective tools

By Stan Silverman

History is the witness that testifies to the passing of time; it illumines reality, vitalizes memory, provides guidance in daily life and brings us tidings of antiquity. — Cicero, *Pro Publio*

Sestio Roman author, orator, & politician
(106 BC-43 BC)

Never let the **future** disturb you. You will meet it, if you have to, with the same weapons of reason which today arm you against the present. — Marcus Aurelius

Antoninus, Meditations, 200 A.D.
(121 AD-180 AD)

The strategies and applications we have presented in this guide represent the current state of videoconferencing in K-12 education. We, as a community of teachers and learners, have gone from a few to thousands of users. Growing school interest is evident in the surge in presentations at national conferences and, more importantly, the integration of videoconferencing into the curriculum. The continued emergence of quality peer-to-peer activities will broaden the scope of videoconference activities and

provide more classrooms and individual students the opportunity to interact.

New technology tools and instructional practices will enable new approaches. We must embrace these tools while not throwing away the effective tools and practices currently being used. Outcomes must be carefully aligned with the technologies and instructional strategies, using only the approaches and technologies that will enhance instruction.

Many of our providers start their interaction with schools by having a pre-connection conversation about the needs of the classroom and the programs and resources prepared by the content provider. To help sharpen the focus on classroom needs, future pre-connection conversations will address the data being collected as part of the *NCLB*-required testing. This data will help design programs that are targeted specifically to gaps in student performance as well as to opportunities for enrichment. Once the data have been used to identify the areas to focus on during a program, the school and content provider can begin the process of designing specific activities.

Let us take a look at this design process using a hypothetical program involving a science museum. The process starts with the museum's educators and the classroom teachers identifying the areas that should be addressed. The classroom teachers, using testing and other evaluation data, determine the general needs, the specific needs and the interests of subgroups of students in the class. For our example, let us say that they select comparative aquatic environments and also want to reinforce a series of basic math concepts.

During the program's first activity, students review existing videos that are stored on a video-

on-demand server. The video database on the server contains commercially available videos as well as videos that were produced by the museum. The students are given specific tasks for acquiring information from the videos. The teachers target each specific task to meet the learning needs of the students. The video clips or segments are built into a playlist and downloaded onto a computer or iPod-like device so that the students can review, analyze and discuss the content as needed. The video resources are supplemented by text and Internet resources to give the students a knowledge base on the various ecosystems.

At this point, the museum schedules the videoconference, utilizing scientists, curators or site educators. The connection concentrates on using the museum resources (human and physical) to develop a series of essential questions about the environment.

The next activity utilizes the relatively easy placement of science probes into an ecosystem and collection of data over time. In our hypothetical model, the museum has arranged for two or more scientifically active sites to place these probes in the environment and to make the probes accessible over the Internet.

In addition, the museum has arranged for a number of schools (national and international) who are working on the same program to connect via webinar tools, like Elluminate™. In this environment, the students can use the Voice-over-IP, the shared

whiteboards and application-sharing to compare and contrast the data which they have been collecting. The museum staff acts as moderator, helping to guide the discussions during the session(s). The students are also added to a discussion board or blog in which they continue to share experiences as they work towards the creation of a final project.

Utilizing video tools, podcasting tools, blogs and other emerging communications tools, the students prepare a presentation addressing the essential questions. The presentations are delivered via a multipoint connection with the museum staff and the participating schools. The students use the feedback they receive on their projects to create a final version, which is published on the museum's website at the conclusion of the program.

This hypothetical model is just one scenario utilizing the tools now available to our schools. The new technologies provide an endless opportunity for new models. We at the EEZ are interested in collecting these ideas and sharing them with the broader community. To help this effort, we are presenting the EEZ Athena contest. In this program we will be offering \$200 awards for the most innovative concepts for the application of these technologies. Please see our website for the entry form at <http://www.nyiteez.org/eezathenacontest.htm>. Awards will be given for five ideas in 2006 -2007 school year and five ideas in 2007-2008. The contest is open to content providers and schools. ■



Directory



<p>3 View USA, Inc. 300 Saunders Road, Suite 100 Riverwoods, IL 60015 847-940-8800 http://www.3viewgroup.com</p>	<p>Adirondack Teacher Center PO Box 327 Paul Smiths, NY 12970 518-327-5012</p>
<p>Albany Institute of History and Art 125 Washington Avenue Albany, NY 12210 518-463-4478 x405 http://www.albanyinstitute.org</p>	<p>Albright-Knox Art Gallery 1285 Elmwood Avenue Buffalo, NY 14222 716-882-8700 http://www.albrightknox.org</p>
<p>Alden Teacher Center 13190 Park Street Alden, NY 14004 716-937-9116 x4124</p>	<p>American Labor Museum, Botto House National Landmark 83 Norwood Street Haledon, NJ 07508 973-595-7953 http://www.labormuseum.org</p>
<p>American Merchant Marine Museum 300 Steamboat Road Kingspoint, NY 11024 516-773-5515 http://www.usmma.edu/museum</p>	<p>American Museum of Natural History Central Park West at 79th Street New York, NY 10024 212-769-5169 http://www.amnh.org</p>
<p>Aquarium of Niagara 701 Whirlpool Street Niagara Falls, NY 14301 716-285-3575 http://www.aquariumofniagara.org/</p>	<p>Arlington Independent School District Professional Development Center 1111 West Arbrook Boulevard Arlington, TX 76015 682-867-7554 http://www.aisd.net/distlearn</p>
<p>Arts4All/ArtsPass 2 West 45th Street, Suite 500 New York, NY 10036 212-391-4007 http://www.artspass.com</p>	<p>Baldwin Teacher Center 960 Hastings Street Baldwin, NY 11510 516-377-9224</p>
<p>Bedford Staff Development Center Fox Lane Campus, Route 172 Bedford, NY 10506 914-241-6116 http://www.bedford.k12.ny.us/nonprofit/staffdev/</p>	<p>BEPT Teacher Center Pelham Memorial High School 640 Colonial Ave, Room 133 Pelham, NY 10803 914-738-7352 http://www.BEPT.org</p>

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<p>Brentwood Teacher Center Wicks Road, 52 Third Avenue Brentwood, NY 11717 631-434-2101</p>	<p>Brighton Teacher Center 2035 Monroe Avenue Rochester, NY 14618 585-242-5199</p>
<p>Bronx Zoo/Wildlife Conservation Society 2300 Southern Boulevard Bronx, NY 10460-1068 718-741-1693 http://bronxzoo.com/distancelearning</p>	<p>Bronxville School Staff Development Center 177 Pondfield Road Bronxville, NY 10708 914-395-0500</p>
<p>Brooklyn Children's Museum 145 Brooklyn Avenue Brooklyn, NY 11213 718-735-4400 http://www.brooklynkids.org</p>	<p>Brooklyn Museum of Art 200 Eastern Parkway Brooklyn, NY 11238 718-638-5000 http://www.brooklynmuseum.org</p>
<p>Brookside Elementary School 2285 Broad Street Yorktown, NY 10598 914-243-8130 http://www.yorktown.org/our%20schools/brookside/brookside_index.htm</p>	<p>Buffalo & Erie County Historical Society 25 Nottingham Court Buffalo, NY 14216 716-873-9644 http://www.bechs.org</p>
<p>Buffalo City Net 672 Delaware Avenue Buffalo, NY 14209 716-882-6147 http://www.buffalocitynet.org/index.aspx</p>	<p>Buffalo Museum of Science 1020 Humboldt Parkway Buffalo, NY 14211 716-896-5200 http://www.sciencebuff.org</p>
<p>Buffalo Teacher Center 150 Lower Terrace, Room 414 Buffalo, NY 14202 716-816-3048 x8760 http://www.buffaloteachercenter.org</p>	<p>Buffalo Zoological Gardens 300 Parkside Avenue Buffalo, NY 14214 716-995-6143 http://www.buffalozoo.org</p>
<p>Camden Children's Garden 3 Riverside Drive Camden, NJ 08103 856-365-8733 http://www.camdenchildrensgarden.org</p>	<p>Canon USA: Educational Sales Channel One Canon Plaza Lake Success, NY 11042 516-328-4602 http://www.consumer.usa.canon.com</p>
<p>Cape Elizabeth Middle School 14 Scott Dyer Road Cape Elizabeth, ME 04107 207-799-8176 http://www.cape.k12.me.us</p>	<p>Carlsbad Municipal Schools 498 North Canyon Street Carlsbad, NM 88220 505-234-3300</p>

<p>Carnegie Museum of Natural History 4400 Forbes Avenue Pittsburgh, PA 15213-4080 412-622-3292 http://www.CarnegieMuseums.org/cmnh</p>	<p>Carolina Biological Supply 2700 York Road Burlington, NC 27215 336-538-6305 http://www.carolina.com</p>
<p>Cattaraugus-Allegany Teacher Center c/o BOCES 1SS 175 North Union Street, Suite 5 Olean, NY 14760 716-376-8381 http://www.cateach.org</p>	<p>Cattaraugus-Allegany-Erie-Wyoming BOCES 1825 Windfall Road Olean, NY 14760 716-376-8200 http://www.caew-boces.wnyric.org</p>
<p>Center for Interactive Learning and Collaboration (CILC) 251 East Ohio Street, Suite 960 Indianapolis, IN 46204 866-826-CILC http://www.cilc.org</p>	<p>Challenger Center for Space Science Education 1250 North Pitt Street Alexandria, VA 22314 703-683-9740 http://www.challenger.org</p>
<p>Chautauqua County Teachers' Center 201 East Fourth Street, Suite 2 Jamestown, NY 14701 716-483-3270 http://teachercenters.e2ccb.org/ectc/index.html</p>	<p>Cincinnati Art Museum 953 Eden Park Drive Cincinnati, OH 45202 513-639-2995 http://www.cincinnatiartmuseum.org</p>
<p>Cleveland Institute of Music Distance Learning Department 11021 East Boulevard Cleveland, OH 44106 216-791-5000 http://www.cim.edu</p>	<p>Cleveland Museum of Art 11150 East Boulevard Cleveland, OH 44106 216-707-2468 http://www.clevelandart.org</p>
<p>Club Conferencing Network, LLC 206 Country Club Road Monroe, LA 71201 318-325-3387 http://www.clubconferencingnetwork.com/</p>	<p>Connecticut International Baccalaureate Academy 857 Forbes Street East Hartford, CT 06118 860-622-5591 http://www.cibanet.org</p>
<p>Connetquot Teacher Center 190 7th Street Bohemia, NY 11716 631-987-3006</p>	<p>Cradle of Aviation Museum One Davis Avenue Garden City, NY 11530 516-572-0559 http://www.cradleofaviation.org</p>
<p>Creative Coalition 665 Broadway, 9th Floor New York, NY 10012 212-614-2143 http://www.thecreativecoalition.org</p>	<p>Diocese of Rockville Centre 50 North Park Avenue, PO Box 9023 Rockville Centre, NY 11570-9023 516-678-5800 x404 http://www.drvc.org/</p>
<p>Dominican College 470 Western Highway Orangeburg, NY 10962 845-359-7800 http://www.dc.edu</p>	<p>Dutchess County BOCES 900 Dutchess Turnpike Poughkeepsie, NY 12603 845-486-4840 http://www.dcboces.org</p>

<p>East Meadow Teacher Center 718 The Plain Road Westbury, NY 11590 516-876-7536</p>	<p>East Ramapo Teacher Center 461 Viola Road Spring Valley, NY 10977 845-577-6375 http://www.ertconline.org</p>
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<p>Eastern Suffolk BOCES - Arts in Education 215 Old Riverhead Road Westhampton Beach, NY 11978 631-288-0290 http://www.esboces.org/AIE</p>	<p>Edith Winthrop Teacher Center of Westchester 475 West Hartsdale Avenue Hartsdale, NY 10530 914-948-8037 http://www.ewteachercenter.org</p>
<p>El Reno Public Schools PO Box 580 El Reno, OK 73036 405-262-4289 http://www.elreno.k12.ok.us</p>	<p>Eleanor Roosevelt High School 411 East 76th Street New York, NY 10021 212-772-1220 http://www.erhsnyc.org</p>
<p>Empower Peace 44 Bromfield Street, 8th Floor Boston, MA 02108 617-912-3800 http://empowerpeace.com/pages/home.html</p>	<p>Erie 1 Institute for Professional Advancement 355 Harlam Road West Seneca, NY 14224 716-825-7504</p>
<p>Erie-Catt Teacher Center 8685 Erie Road Angola, NY 14006 716-549-4454 x4054 http://teachercenters.e2ccb.org/ectc/index.html</p>	<p>Evaluation Consortium 1400 Washington Avenue Albany, NY 12222 518-442-3300 http://www.albany.edu/eval/</p>
<p>Everson Museum of Art 401 Harrison Street Syracuse, NY 13202 315-474-6064 http://www.everson.org</p>	<p>Expedite Videoconferencing Services, Inc. 1025 Old Country Road, West Wing Westbury, NY 11590 516-338-7700 http://www.expeditevcs.com</p>
<p>Fairport Teacher Center Fairport High School Fairport, NY 14450 585-421-2039</p>	<p>Farmingdale Teacher Center 95 Woodward Parkway Farmingdale, NY 11735 516-752-6539 http://www.farmingdaleteachercenter.org</p>
<p>Fordham Univ Regional Educational Technology Center 441 East Fordham Road Walsh Library, Suite 039 Bronx, NY 10458 718-817-3503 http://www.retc.fordham.edu/</p>	<p>Freeport Memorial Library 144 West Merrick Road Freeport, NY 11520 516-379-3274 http://www.nassaulibrary.org/freeport</p>

<p>Freeport Teacher Center 50 South Brookside Avenue Freeport, NY 11520 516-867-5385</p>	<p>Friends of the Arts PO Box 702 Locust Valley, NY 11560 516-922-0061 http://www.FOTApresents.org</p>
<p>Genesee Region Teacher Center Prospect School Prospect Street Attica, NY 14011 585-591-0400 x2103</p>	<p>George Eastman House 900 East Avenue Rochester, NY 14607 585-271-3361 x232 http://www.eastmanhouse.org</p>
<p>George Lucas Educational Foundation PO Box 3494 San Rafael, CA 94912 415-662-1600 http://www.edutopia.org/</p>	<p>GKE Foundation; Insynthesis LLC 46 Featherbed Lane Flemington, NJ 08822 908-782-0894 http://www.insynthesis.com</p>
<p>Global Knowledge Exchange 155 Route 46 Wayne Interchange Plaza II Wayne, NJ 07470 973-890-0010 http://www.gkefoundation.org</p>	<p>Gowanda Central School 10674 Prospect Street Gowanda, NY 14070 716-532-6301 http://www.gowcsd.com</p>
<p>Great Neck Teacher Center North Middle School 77 Polo Road Great Neck, NY 11023 516-773-1763</p>	<p>Greater Rochester Teacher Center Network Greece Teaching & Learning Center 1790 Latta Road, Front Building Rochester, NY 14612 585-966-2130 http://www.greece.k12.ny.us/tlc/</p>
<p>Guggenheim Museum 1071 Fifth Avenue New York, NY 10128 212-423-3510 http://www.guggenheim.org</p>	<p>Hempstead TRACT Center Fulton School 40 Fulton Avenue Hempstead, NY 11550 516-292-7111 x4205</p>
<p>Herricks Teacher Center Community Center 999B Herricks Road Room 209 New Hyde Park, NY 11040 516-248-3111 http://www.herricks.org</p>	<p>High Falls Historic District 60 Brown's Race Rochester, NY 14614 585-325-2030</p>
<p>Hitachi Foundation 1509 22nd Street, NW Washington, DC 20037 202-828 -1643 http://www.hitachi.org</p>	<p>Holocaust Memorial and Tolerance Center of Nassau County Welwyn Preserve 100 Crescent Beach Road Glen Cove, NY 11542 516-571-8043 http://www.holocaust-nassau.org</p>

Horseheads Central School District Educational Support Center One Raider Lane Horseheads, NY 14845 607-739-5601 x4252	Hudson River Teacher Center PNW BOCES 200 BOCES Drive Yorktown Heights, NY 10598 914-248-2344 http://www.pnwboces.org/teachercenter/welcome.htm
Huntington Teacher Center Huntington High School Oakwood & McKay Roads Huntington, NY 11743 631-673-3002 http://www.teacherweb.com	Hunts Point Recreation Center 765 Manida Street Bronx, NY 10474 718-860-5544 http://www.nycgovparks.org/sub_things_to_do/recreation_centers/rc_hunts_point.html
Indianapolis Museum of Art 4000 Michigan Road Indianapolis, IN 46208-3326 317-923-1331 x218 http://www.ima-art.org/	Informed Decision Services 14 Ingold Drive Dix Hills, NY 11746 631-427-1661 http://www.researchforeducation.com
Institute for Ecosystem Studies Box AB Route 44A Millbrook, NY 12545 845-677-5343 http://www.ecostudies.org	Intercounty Teacher Resource Center NYIT-300 Carleton Avenue Building 66, Room 217 Central Islip, NY 11722 631-348-3242 http://www.nyiteez.org/itrc
International Debate Education Association (IDEA) 400 West 59th Street 4th Floor New York, NY 10019 212-548-0185 http://www.idebate.org	International Education and Resource Network 475 Riverside Drive Room 540 New York, NY 10115 212-870-2673 http://www.learn.org
Intrepid Sea, Air & Space Museum Pier 86 West 46th & 12th Avenue New York, NY 10036 212-957-7057 http://www.intrepidmuseum.org	Islips, Staff Development Center 3500 Sunrise Highway, Suite D109 Great River, NY 11739 631-224-1285
Jazz at Lincoln Center 33 West 60th Street New York, NY 10023 212-258- 9800 http://www.jalc.org	JCE Consulting, Inc. 554 7th Street, Suite 1L Brooklyn, NY 11215 917-916-5590
Jefferson-Lewis Teacher Center 24104 State Route 3 Watertown, NY 13601 315-785-9143 http://www.jlteacher.org	Jersey Cow Software 3031 Route 27, Suite D Franklin Park, NJ 08823 732-422-0101 http://www.jerseycow.com

Journeys Into American Indian Territory PO Box 575 Eastport, NY 11941 631-878-8655 http://www.indianjourneys.com	Just Kids - Early Childhood Learning Center PO Box 12 Longwood Road Middle Island, NY 11953 631-924-0008 http://www.justkidsschool.com/
Kenmore Staff Development Center 3200 Elwood Avenue Kenmore, NY 14217-1174 716-874-8411 x7309 http://www.kenton.k12.ny.us	KnitMedia of the Knitting Factory 81 Franklin Street New York, NY 10013 212-219-3006 x429 http://www.knittingfactory.com
Lackawana Teacher Center 550 Martin Road, Room 101A Lackawana, NY 14128 716-827-6762 http://www.teacherweb.com/NY/LackawannaCitySchoolDistrict/LackawanaTeacherCenter/h0.stm	Lakeland Regional High School 205 Conklintown Road Wanaque, NJ 07465 973-835-1900 x159 http://www.lakeland.k12.nj.us/
Lehman College - The City University of New York 250 Bedford Park Boulevard West Bronx, NY 10468 718-960-8006 http://www.lehman.cuny.edu	Levittown Teachers' Center 150 Abbey Lane Levittown, NY 11756 516-520-8300 x671
Liberty Science Center 251 Philips Street, Liberty State Park Jersey City, NJ 07305 201-200-1000 x1381 http://www.lsc.org	Living Schoolbook Syracuse University School of Education 030 Huntington Hall Syracuse, NY 13244 315-443-3450 http://www.lsb.syr.edu
Long Beach Public Schools 235 Lido Boulevard Lido Beach, NY 11561 516-897-2129 http://www.lbeach.org/	Long Beach Teacher Center Blackheath Complex, Building C Blackheath Road Long Beach, NY 11561 516-897-2083
Long Island Children's Museum 11 Davis Avenue Garden City, NY 11530 516-224-5800 http://www.licm.org	Long Island Maritime Museum 86 West Avenue, PO Box 184 West Sayville, NY 11796 631-854-4974 http://www.limaritime.org
Long Island Museum 1200 Route 25 A Stony Brook, NY 11790 631-751-0066 http://www.longislandmuseum.org	Long Island Museum of Science and Technology 1 Davis Avenue Garden City, NY 11530 516-390-5174 http://www.limsat.org

<p>Lower Hudson Teacher Center Network Putnam/Northern Westchester BOCES, Program Building Yorktown Heights, NY 10598 914-245-2700 http://www.pnwboces.org/teachercenter/</p>	<p>Lyndhurst - A National Trust Historic Site 635 South Broadway Tarrytown, NY 10591 914-631-4481 http://www.lyndhurst.org</p>
<p>Malverne Teachers Center Davidson Avenue Elementary School 45 Davidson Avenue Lynbrook, NY 11563 516-887-6463</p>	<p>Manhasset Teacher Resource Center 200 Memorial Place Manhasset, NY 11030 517-267-7633 http://www.manhassettrc.org</p>
<p>Manhattan Day School 310 West 75th Street New York, NY 10023 212-376-6800 http://www.mdsweb.org</p>	<p>Manhattan School of Music 120 Claremont Avenue New York, NY 10027 212-749-2802 x4401 http://www.msmnyc.edu</p>
<p>Maria Fareri Children's Hospital Westchester Medical Center Valhalla, NY 10595 866-962-7337 http://mariafarerichildrenshospital.wcmc.com/</p>	<p>McClure Productions Inc. PO Box 293 Geneseo, NY 14454 585-243-0324 http://www.mcclureproductions.com</p>
<p>Middle Country Teacher Center Unity Drive Pre-K/K Center 11 Unity Drive Centereach, NY 11720 631-285-8785</p>	<p>Middletown Teacher Center 441 East Main Street Middletown, NY 10940 845-341-5673</p>
<p>Mid-East Suffolk Teacher Center (MESTRACT) 105 Ridge Road Ridge, NY 11961 631-345-3461 http://www.mesttract.org</p>	<p>Mid-Hudson Teacher Center SUNY New Paltz, Old Main Building Room 212 75 South Manheim Boulevard New Paltz, NY 12561 845-257-2885 http://www.mhtc.dcboces.org</p>
<p>Monmouth County Vocational School District 4000 Kozloski Road, PO Box 5033 Neptune, NJ 07728 732-869-1181 x305 http://www.mcvsd.org</p>	<p>Monroe #1 BOCES Technology Services 11 Linden Park Rochester, NY 14625 585-249-7200 http://www.monroe.edu/</p>
<p>Monroe 2 - Orleans BOCES 3625 Buffalo Road Rochester, NY 14624 585-352-2700 http://www.monroe2boces.org</p>	<p>M-TRACT The Massapequa Teacher Center McKenna School Spruce Street Massapequa Park, NY 11762 516-797-6045</p>
<p>Multicultural Visions Through the Arts 233 East 69th Street , #6M New York, NY 10021 212-737-4261</p>	<p>Museum of Modern Art 11 West 53rd Street New York, NY 10019 212-333-6574 http://www.moma.org</p>

<p>Museum of the City of New York 1220 Fifth Avenue New York, NY 10029 212-534-1672 x3387 http://www.mcny.org</p>	<p>Museum of the Hudson Highlands PO Box 181 The Boulevard Cornwall-on-Hudson, NY 12520 845-534-7781 http://www.museumhudsonhighlands.org</p>
<p>Museum of Tolerance 9760 West Pico Boulevard Los Angeles, CA 90035 310-553-9036 http://www.museumoftolerance.org</p>	<p>My Technology Partners 14 Doty Road PO Box 1 Haskell, NJ 07420 800-905-MTP1 http://www.MTP-USA.com</p>
<p>Mystic Aquarium - Institute for Exploration 55 Coogan Boulevard Mystic, CT 06355 860-572-5955 http://www.mysticaquarium.org</p>	<p>Nassau BOCES - Curriculum, Instruction & Technology Hawthorn Center, 200 Second Avenue Massapequa Park, NY 11762 516-608-6648 http://www.nassauboces.org</p>
<p>Nassau BOCES - Department of Career & Technical Edu Administrative Center 71 Clinton Road PO Box 9195 Garden City, NY 11530 516-396-2390 http://www.nassauboces.org</p>	<p>Nassau County Museum of Art One Museum Drive Roslyn Harbor, NY 11576 516-484-9338 x218 http://www.nassaumuseum.org</p>
<p>Nassau TRACT Teacher Center Adelphi University Harvey 105 Garden City, NY 11530 516-877-4353 http://www.nassautract.org</p>	<p>National Baseball Hall of Fame 25 Main Street PO Box 590 Cooperstown, NY 13326 607-547-7200 http://www.baseballhalloffame.org</p>
<p>National Indian Telecommunications Institute 1205 Calle Luna Santa Fe, NM 87501 505-986-3872 http://www.niti.org</p>	<p>National Park Service Gateway National Recreation Area 210 New York Avenue Staten Island, NY 10305 718-354-4517 http://www.nps.gov</p>
<p>New Jersey Governor's School The College of New Jersey, PO Box 7718 Ewing, NJ 08628 609-771-3114 http://www.tcnj.edu/~njgovsch/index2.htm</p>	<p>New Rochelle Staff Resource Center New Rochelle High School, Room 1310 265 Clove Road New Rochelle, NY 10801 914-576-4593</p>
<p>New York Catholic Conference 465 State Street Albany, NY 12203 518-434-6195 http://www.nyscatholicconference.org</p>	<p>New York City Board of Education, Div. MIS 52 Chambers Street, Room 208 New York, NY 10007 212-374-0320 http://www.nycenet.edu/oit</p>

<p>New York City Department of Education 2 Metro Tech Center, Suite 3600 Brooklyn, NY 11201 718-935-3517 http://www.nycenet.edu</p>	<p>New York City Housing Authority 250 Broadway, 24th Floor New York, NY 10007 212-306-3000 http://www.nyc.gov/html/nycha/home.html</p>
<p>New York Hall of Science 47-01 111th Street, Flushing Meadows Corona Park, NY 11368 718-699-0005 http://www.nyhallsci.org</p>	<p>New York Historical Society 170 Central Park West New York, NY 10024 212-485-9218 http://www.nyhistory.org</p>
<p>New York Institute of Technology, Culinary Arts Center 300 Carleton Avenue Central Islip, NY 11722 631-348-3145 http://iris.nyit.edu/culinary/</p>	<p>New York Institute of Technology, Old Westbury Campus Northern Boulevard Old Westbury, NY 11568 800-345-6948 http://www.nyit.edu</p>
<p>New York Institute of Technology, TBLS 300 Carleton Avenue, Building 66, Room 217 Central Islip, NY 11722 631-348-3317 http://www.nyit.edu/</p>	<p>New York State Education Department 89 Washington Avenue Albany, NY 12234 518-474-3852 http://www.nysed.gov</p>
<p>New York State Museum 3099 Cultural Education Center Albany, NY 12230 518-474-4458 http://www.nysm.nysed.gov</p>	<p>New York State Teacher Centers New York State Education Department Room 467-EBA Albany, NY 12234 518-473-1234 http://www.teachercenters.org</p>
<p>Newburgh Teacher Center 1001 1st Street New Windsor, NY 12553 845-568-6560 http://newburghschools.org/newburgh/district/teacher/teacher.cfm/</p>	<p>Niagara Falls Teacher Resource Center 4455 Porter Road Niagara Falls, NY 14305 716-286-7947 http://www.nftrc.org</p>
<p>North Bellmore Teacher Center Saw Mill Road School, 2801 Saw Mill Road North Bellmore, NY 11710 516-992-3046</p>	<p>North Hudson Electronic Education Empowerment Proj 1153 Burgoyne Avenue Fort Edward, NY 12828 518-743-2325</p>
<p>Northern Westchester-Putnum Teacher Center Projects Building, 200 BOCES Drive Yorktown Heights, NY 10598 914-248-2368 http://www.nwpteachercenter.yorktown.ny.us/</p>	<p>Northwest Regional Educational Laboratory 101 S.W. Main, Suite 500 Portland, OR 97204 503-275-0650 http://www.nwrel.org</p>

<p>NY Wired Solution Center Mentoring Partnership of Long Island 1500 Motor Parkway, Suite 90 Hauppauge, NY 11788 631-761-7800 http://www.mentorkids.org</p>	<p>Nyack Teacher Center 13A Dickinson Avenue Nyack, NY 10960 845-353-7060</p>
<p>NYC Region 1 One Fordham Plaza Bronx, NY 10458 718-741-7675 http://www.regionone.us</p>	<p>NYC Region 10 4360 Broadway, Room 530 New York, NY 10033 917-521-3717</p>
<p>NYC Region 9 333 7th Avenue New York, NY 10001 212-356-3735 http://www.r9training.com</p>	<p>NYCDOE - ClassNet Region 9 777 Seventh Avenue New York, NY 10019 732-740-2663</p>
<p>Ocean of Know 178 Dover Furnace Road Dover Plains, NY 12522 845-797-0968 http://www.oceanofk.org</p>	<p>Oceanside Professional Development Center 145 Merle Avenue Oceanside, NY 11472 516-678-7598 http://oceansidepdc.com/</p>
<p>Ohio Historical Society - Fort Ancient Memorial State Park Museum 6123 State Route 350 Oregonia, OH 45054 513-932-4421 http://www.ohiohistory.org/places/ftancien</p>	<p>OMNiLEARN 130 Barrow Street Apt 519 New York, NY 10014 212-924-1705 http://www.OmniLearnCorp.com</p>
<p>Open Minds Open Doors 49 Creeping Hemlock Drive Norwalk, CT 06851 203-846-2642 http://www.openminds-opendoors.com</p>	<p>Orange-Ulster BOCES 163 Harriman Heights Road Monroe, NY 10950 845-781-4363 http://www.ouboces.org</p>
<p>Orleans Niagara Teacher Center 4124 Saunders Settlement Road, Conference Center Sanborn, NY 14132 800-836-7510 x3757 http://www.ontract.org</p>	<p>Ossining Staff Development Center Ossining High School, 29 South Highland Avenue Ossining, NY 10562 914-762-7181 http://www.osdcoline.org</p>
<p>Our Lady of the Magnificat School Miller Road Kinnelon, NJ 07405 973-838-6222</p>	<p>OWL Teacher Center at Lindenhurst 350 Daniel Street, Room 107 Lindenhurst, NY 11757 631-226-2772 http://www.owlcenter.org</p>

<p>PASCO Scientific 10101 Foothills Boulevard Roseville, CA 95747 800-772-8700 x221 http://www.pasco.com</p>	<p>Peace Corps World Wise Schools 1111 20th Street, NW Washington, DC 20526 202-692-1468 http://www.peacecorps.gov</p>
<p>Peconic Teacher Center 141 Narrow Lane Southampton, NY 11968 631-591-4629 http://www.peconicteachercenter.org</p>	<p>Philadelphia Museum of Art 26th Street & Benjamin Franklin Parkway, PO Box 7646 Philadelphia, PA 19101-7646 215-684-7399 http://www.philamuseum.org</p>
<p>Philadelphia Zoo 3400 West Girard Avenue Philadelphia, PA 19104 215-243-1100 http://www.phillyzoo.org</p>	<p>Pioneer School District Box 579, County Line Road Yorkshire, NY 14173 716-492-9300 http://www.pioneer.wnyric.org</p>
<p>Pioneer Teacher Center PO Box 619 Yorkshire, NY 14173 716-492-9386 http://pioneerteachercenter.org</p>	<p>Pittsford Teacher Center 1303 Marsh Road Pittsford, NY 14534 585-218-1071</p>
<p>Plainedge Teacher Center Wyngate & Peony Drive North Massapequa, NY 11758 516-992-7473</p>	<p>Pollock-Krasner House & Study Center 830 Fireplace Road East Hampton, NY 11937 631-324-4929 http://www.pkhouse.org</p>
<p>Polycom 1 Penn Plaza, Suite 1614 New York, NY 10119 212-372-6970 http://www.polycom.com</p>	<p>Port Jefferson Middle School Old Post Road Port Jefferson, NY 11777 631-476-4440 http://www.portjeff.k12.ny.us/schools/middle.asp</p>
<p>Port Washington Teacher Center Carrie Palmer Weber Middle School, 99 Campus Drive Port Washington, NY 11050 516-767-5615 http://portnet.k12.ny.us/teachercenter</p>	<p>Prattsburgh Central School 1 Academy Street Prattsburgh, NY 14873 607-522-3795 http://www.prattsburgh.wnyric.org/</p>
<p>Project PATCH 110 Elwood Road Northport, NY 11768 631-262-6874 http://northport.k12.ny.us/~patch/</p>	<p>Project View 108 Education Drive Schenectady, NY 12303 518-370-8100 x120 http://www.projectVIEW.org</p>
<p>Queens Borough Public Library 89-11 Merrick Boulevard Jamaica, NY 11432 718-990-0700 http://www.queenslibrary.org</p>	<p>Queens Botanical Garden 43-50 Main Street Flushing, NY 11355 718-886-3800 http://www.queensbotanical.org</p>

<p>Queens Children's Center 74-03 Commonwealth Boulevard Bellerose, NY 11426 718-264-4508 http://www.omh.state.ny.us/omhweb/facilities/qcpc/facility.htm</p>	<p>RBH Multimedia, Inc. 12 Hatch Terrace Dobbs Ferry, NY 10522 914-693-8755 http://www.rbhmedia.com</p>
<p>Region 14 Educational Service Center 1850 Highway 351 Abilene, TX 79601 325-675-8668</p>	<p>Region 4 Special Grants and Gifted Office 33-34 80th Street, B21 Jackson Heights, NY 11372 718-397-5430</p>
<p>Remsen Teacher Resource Center PO Box 406 Remsen, NY 13438 315-831-5397</p>	<p>Richard Gazzola Teacher Center of Yonkers 1109 North Broadway Yonkers, NY 10701 914-376-8614/8615</p>
<p>Rockland BOCES 65 Parrott Road West Nyack, NY 10994 845-627-4700 http://www.rocklandboces.org</p>	<p>Rockland County Solid Waste Management Authority 420 Torne Valley Road Hillburn, NY 10931 845-753-2200 http://www.rocklandrecycles.com</p>
<p>Rockland Teachers' Center Institute 65 Chapel Street Garnerville, NY 10923 845-942-0354 x315 http://www.rockteach.org</p>	<p>Rockville Centre Teacher Center 110 Riverside Drive Rockville Centre, NY 11572 516-255-8812 http://www.rvcschools.org/rvctc</p>
<p>Roslyn Teacher Center Roslyn High School Roslyn Hill Road Roslyn, NY 11576 516-625-6584</p>	<p>Rush-Henrietta Teacher Center 694 Erie Station Road West Henrietta, NY 14586 585-359-7970 http://www.rhnet.org</p>
<p>Rutgers University - Center for Mathematics, Science and Computer Education (CMSCE) 118 Frelinghusen Road Piscataway, NJ 08854 732-445-0670 http://cmsce.rutgers.edu</p>	<p>S.S. Cyril and Methodius School 105 Half Hollow Road Deer Park, NY 11729 631-667-6229 http://www.sscyrilandmethodius.org</p>
<p>Sachem Teacher Center 212 Smith Road Lake Ronkonkoma, NY 11779 631-467-5482</p>	<p>Safari 50 West 72 Street, Suite 1202 New York, NY 10023 212-362-3669 http://www.SAFARIVideonetworks.com</p>
<p>Save the Children U.S. 54 Wilton Road, PO Box 950 Westport, CT 06881 203-221-4000 http://www.savethechildren.org</p>	<p>Scarsdale Public Schools 2 Brewster Road Scarsdale, NY 10583 914-721-2322 http://www.scarsdaleschools.k12.ny.us</p>

<p>Scarsdale Teachers Institute 2 Brewster Road Scarsdale, NY 10583 914-721-2580 http://www.scarsdaleschools.org/sti/</p>	<p>Schenectady City School District 108 Education Drive Schenectady, NY 12303 518-370-8100 http://www.schenectady.k12.ny.us</p>
<p>Schenectady Museum & Suits - Bueche Planetarium Nott Terrace Heights Schenectady, NY 12308 518-382-7890 http://www.schenectadymuseum.org</p>	<p>SEEDS, Perry Local School District 2100 38th Street, NW Canton, OH 44709 330-477-3486 http://www.stark.k12.oh.us</p>
<p>Seneca Park Zoo 222 St. Paul Street Rochester, NY 14621 585-336-7200 http://www.senecazoo.org</p>	<p>Shelby County Schools - Alabaster 601 First Street South Alabaster, AL 35007 205-682-5932 http://shelbyed.dwd.net/school_listings.aspx</p>
<p>Shelby County Schools - Columbiana 410 East College Street PO Box 1910 Columbiana, AL 35051-1910 205-682-7062</p>	<p>Shiprock Administration Complex PO Box 1199 Shiprock, NM 87420 505-368-4984 http://www.centralschools.org/</p>
<p>Simply Elementary 401 East 64th , Street #6E New York, NY 10021 212-288-9259 http://www.simplyelementary.org</p>	<p>Smithsonian Environmental Research Center 647 Contees Wharf Road, PO Box 28 Edgewater, MD 21037 443-482-2470 http://www.serc.si.edu</p>
<p>Smithsonian National Board, Education Committee 55 Liberty Street, Ste 23B New York, NY 10005 212-385-2566 http://www.si.edu/giving/od/connections.htm</p>	<p>Smithtown Central School District 26 New York Avenue Smithtown, NY 11787 631-382-2055 http://www.smithtown.k12.ny.us/</p>
<p>Smithtown Teacher Center 26 New York Avenue Smithtown, NY 11787 631-382-2111 http://www.smithtown.k12.ny.us/t-center/</p>	<p>South Country Teacher Center Brookhaven Annex 101 Fireplace Neck Road Brookhaven, NY 11772 631-730-1757</p>
<p>South Huntington Teacher-Parent Resource Center Walt Whitman High School 301 West Hills Road, Room 401 Huntington, NY 11746 631-425-5489 http://www.shuntington.k12.ny.us</p>	<p>Southern Oregon Educational District 101 North Grape Street Medford, OR 97501 541-776-8565 http://www.soesd.k12.or.us/</p>
<p>Southtown Teachers Center 123 Union Street Hamburg, NY 14075 716-649-6775 http://www.stcweb.org</p>	<p>St. John's Episcopal School 848 Harter Road Dallas, TX 75218 214-328-9131 http://www.stjohnsschool.org</p>

<p>Suffolk's Edge Teacher Center 31 Lee Avenue Wheatley Heights, NY 11978 631-254-0107</p>	<p>Sullivan County Teacher Center 6 Wierk Avenue Liberty, NY 12754 845-292-0082 x121 http://www.scteachercenter.org/</p>
<p>Susan B. Anthony House Madison Avenue Rochester, NY 14608 585-279-7490 http://www.susanbanthonyhouse.org</p>	<p>Sweet Home Betty Summers Teacher Center 1901 Sweet Home Road Amherst, NY 14228 716-250-1265 http://www.sweethomeschools.com/tc/</p>
<p>Syosset TRACT Center HB Thompson Middle School, Ann Drive Syosset, NY 11791 516-364-5770 http://www.syosset.k12.ny.us</p>	<p>T.H.E. Journal 17501 East 17th Street, Suite 230 Tustin, CA 92780 714-730-4011 http://www.thejournal.com</p>
<p>TANDBERG, LLC 1860 Michael Faraday Drive, Suite 250 Reston, VA 20190 703-709-4281 http://www.tandberg.net</p>	<p>Teacher Center of Cheektowaga 777 Maryvale Drive, Room 109 Cheektowaga, NY 14225 716-632-1042</p>
<p>Teacher Center of the Western Hamptons Administration Building, 340 Mill Road Westhampton Beach, NY 11978 631-288-3800 x264 http://www.tcwesterhamptons.com</p>	<p>Teacher Institute of Mamaroneck Mamaroneck UFSD, 1000 West Boston Post Road Mamaroneck, NY 10543 914-220-3012 http://www.mamkschools.org/ti/</p>
<p>Technology & Learning c/o Gwen Solomon 300 East 85th Street, #3004 New York, NY 10028 212-472-5055 http://www.techlearning.com</p>	<p>Telecare 1200 Glenn Curtiss Boulevard Uniondale, NY 11553 516-538-8704 http://www.telecaretv.org</p>
<p>Tele-Measurements Inc 50 Harwood Drive East Glen Cove, NY 11542 800-223-0052 http://www.telemeasurements.com/</p>	<p>The Joseph M. Barry Career & Technical Education Ctr 1196 Prospect Ave. Westbury, NY 11590 516-622-6837 http://www.barrytech.org</p>
<p>The Maritime Aquarium at Norwalk 10 North Water Street Norwalk, CT 06854 203-852-0700 x2267 http://maritimeaquarium.org</p>	<p>The Museum of Television & Radio, LA 465 North Beverly Drive Beverly Hills, CA 90210 310-786-1034 http://www.mtr.org</p>
<p>The Museum of Television & Radio, NYC 25 West 52nd Street New York, NY 10019 212-621-6664 http://www.mtr.org</p>	<p>The Southern Tier School/Community Network VE Wightman Primary School, 216 Maple Heights Bath, NY 14810-1016 607-776-1632 http://www.infoblvd.net/tcenter</p>

<p>The Teachers Center at Purchase College 735 Anderson Hill Road Natural Science Building, Room 1007 Purchase, NY 10577 914-251-6876 http://www.mhtc.dcboces.org</p>	<p>Toledo Zoo PO Box 140130 Toledo, OH 43614 419-385-5721 x2044 http://www.toledozoo.org</p>
<p>Tonawanda/Grand Island Teacher Center 202 Broad Street Tonawanda, NY 14150 716-695-6172 http://www.tona.wnyric.org/teachercenter.htm</p>	<p>Tri-County Teacher Center Livonia CSD POB E, 6 Puppy Lane Livonia, NY 14487 585-346-4081</p>
<p>UFT Teacher Center 52 Broadway, 18th Floor New York, NY 10004 212-475-3737 http://www.ufttc.org</p>	<p>Unger Associates 38 Old Coach Road, Suite 7 East Setauket, NY 11733 631-751-8174</p>
<p>United Space Alliance 1150 Gemini Houston, TX 77058 281-212-6200 http://www.unitedspacealliance.com</p>	<p>United States Holocaust Memorial Museum 100 Raoul Wallenberg Place, SW Washington, DC 20024-2126 202-488-6114 http://www.ushmm.org</p>
<p>US Merchant Marine Academy 300 Steamboat Road Kingspoint, NY 11024 718-773-5154 http://www.usmma.edu</p>	<p>Valley Stream Teacher Resource Center 1 Kent Road, Room 51 Valley Stream, NY 11580 516-561-1492</p>
<p>Verizon 1300 I Street, NW, Suite 400 West Washington, DC 20005 202-515-2434 http://www.verizon.com</p>	<p>Verizon TelcomPioneers 106 8th Lane Kirkland, WA 98033 202-494-4160 http://www.verizonpioneers.org/</p>
<p>Victor Teaching Center 953 High Street Victor, NY 14564 585-924-3252 x1100</p>	<p>Videodiscovery 1700 Westlake Avenue, Suite 600 Seattle, WA 98109-3012 206-285-5400 http://www.videodiscovery.com</p>
<p>Walden Media 73 Grozier Road Cambridge, MA 02138 617-491-5723 http://www.walden.com</p>	<p>Wantagh Seaford Teacher Center Wantagh Middle School, 3299 Beltagh Avenue Wantagh, NY 11793 516-679-6404 http://www.seaford.k12.ny.us</p>
<p>Ward Melville Heritage Organization PO Box 572 Stony Brook, NY 11790 631-751-2244 http://www.wardmelvilleheritage.org</p>	<p>Warwick Valley Central School District PO Box 595 Warwick, NY 10990-0595 548-987-3014 http://www.warwickvalleyschools.com</p>

<p>Washingtonville Teacher Center c/o Taft Elementary School, 20 Toleman Road Washingtonville, NY 10992 845-497-4065 http://www.ws.k12.ny.us/tc/index.htm</p>	<p>Waterloo Teachers' Resource Center Main Street Shopping Center, Suite 212 Waterloo, NY 13165 315-539-5454</p>
<p>Waterways Project 393 Saint Pauls Avenue Staten Island, NY 10304 718-442-7429 http://www.tenpennyplayers.org</p>	<p>Wayne Teacher Resource Center Wayne Central School District 6200 Ontario Center Road Ontario Center, NY 14520 315-524-1072</p>
<p>Wayne-Finger Lakes Teacher Center 121 Drumlin Court, Arcadia Building Newark, NY 14513-1863 315-332-7272 http://www.trc.org</p>	<p>Webster Teacher Center 875 Ridge Road Webster, NY 14580 585-670-5073 http://www.webster.monroe.edu/wtc</p>
<p>West Irondequoit Teaching Learning Center 2400 Oakview Drive Scottsville, NY 14556 585-336-3144</p>	<p>West Seneca Teacher Center 1397 Orchard Park Road West Seneca, NY 14224 716-677-3247 http://www.westseneca.wnyric.org/</p>
<p>Westchester Arts Council 31 Mamaroneck Avenue White Plains, NY 10601 914-428-4220 http://www.westarts.com</p>	<p>Western Suffolk BOCES Instructional Support Services, 31 Lee Avenue Wheatly Heights, NY 11798 631-242-1128 http://www.wboces.org</p>
<p>Wheatland-Chili Teacher Center 13 Beckwith Avenue Scottsville, NY 14546 585-889-6285</p>	<p>White Plains Staff Development Center 500 North Street White Plains, NY 10605 914-422-2438</p>
<p>Whitesboro Teacher Center 67 Whitesboro Street Yorkville, NY 13495 315-266-3313 http://www.wboro.org</p>	<p>William Floyd Teacher Center William Floyd High School, 240 Mastic Beach Road Mastic Beach, NY 11951 631-878-2266 http://www.wfsd.k12.ny.us</p>
<p>Williamsville Education Center 151 Paradise Road, Room 220 East Amherst, NY 14051 716-626-8450 http://www.wec-online.org</p>	