Facing the World:
Telepresence in Education

A New Learning Environment

A media-savvy generation of learners is now driving unprecedented change in the education sector. Students armed with laptops, smartphones, and tablets fluidly connect to each other through Facebook, Twitter, YouTube, and blogs. With the explosion of social media in the last few years and its rippling effects on communications, there is growing evidence that streaming video and multimedia content are successfully engaging students in new forms of active and collaborative learning. New media technologies dovetail perfectly with emerging theories and paradigms for education, emphasizing experiential and collaborative learning.

This guide focuses on interactive video communication, or telepresence. Telepresence simulates a traditional face-to-face environment, the very oldest form of teaching, but no longer limits students and teachers to being in the same place. Participants at multiple sites are able to see, hear, and interact with each other in real time. Telepresence is assisting K–20 schools around the world in overcoming geographic and financial barriers.

“Telepresence expands the learning environment by offering students a virtual window on the real world, by reducing administration costs so more can be spent on teaching, and offering increased equity of access to learning for all.”

Antoinette Guglielmo, Ph.D., Distance Learning Educator, Los Angeles County Museum of Art

TABLE OF CONTENTS

A New Learning Environment.........1–3
The New Pedagogy.........................3–5
Applications for the New Economy........5–6
Equipment Considerations........7–8
Network Considerations........8–9
Key Areas for Success........9–12

Toolkits
T1. Preparing Your Business Case......14–15
T2. Equipment Selection......................16
T3. Network Considerations........17–18
T4. Applying for Grants........18–19
T5. Accessing Support Organizations........20–21
T6. Telepresence and National Education Priorities.........22–25
T7. Teaching via Telepresence........26–27
T8. Benefits of Telepresence........28–29
T9. Content Providers........30–33
It is being used successfully to expand curriculum options, maximize scarce resources, increase teacher and student engagement, and improve outcomes. It delivers a new type of interactive education to meet the needs and requirements of 21st century learners as global citizens of the world.

Telepresence is not intended to replace traditional classroom teaching or online learning. Rather, it complements both, further enabling students to better understand, integrate, share, and apply knowledge to 21st century challenges. Through telepresence, students explore the world, travel to various locations, and interact face-to-face with others without ever leaving the classroom.

The challenges facing educational institutions today are vast and often daunting. Federal, state, and district budgets are being slashed, which means deficiencies in staffing, inability to offer required courses, and increased difficulty in obtaining professional development training. Rural and high-poverty and/or high-minority schools often suffer the most from these cuts.

In addition to these issues, educators are required to adhere to policy imperatives promulgated by federal and state governments that are eager to produce a workforce that can meet new challenges. These mandates require that technology be integrated into the classroom to equip students with an education tailored for tomorrow’s economies.

The bipartisan congressional, web-based Education Committee observed, “New [instructional] designs are needed to create the “knowledge workers” who will define the Information Age.”

Today and beyond, employers want workers with the skills to solve real-world problems in a global economy. This means students must learn how to collaborate using technology that crosses national borders. They need a broadened perspective that allows them to face multiple world views.

“[If you could eliminate time, and you could eliminate distance, what could you do? You could tap the wisdom, expertise, innovation and knowledge of anyone, anytime, anywhere – now that’s the promise of distance education.]"

Dr. Antonio Paradis, Executive Director
Southeastern Regional Education Service Center

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Top 3 Benefits of Interactive Videoconferencing

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<th>Benefit</th>
<th>Description</th>
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<td><strong>Maximized Budget</strong></td>
<td>Interactive video communications reduces fuel costs, expenses, and travel time for K-20 field trips, professional development programs, and content provider programs.</td>
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<td><strong>Increased Access</strong></td>
<td>Interactive video communications dissolves geographic boundaries, creates exciting virtual field trips to remote sites, and provides increased equity for all learners.</td>
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<tr>
<td><strong>Expanded Learning</strong></td>
<td>Interactive video communications provides live interaction with experts not otherwise available, increases social learning and collaborative opportunities among teachers and students, and facilitates global awareness.</td>
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Telepresence offers solutions to many of these challenges, allowing K–20 schools to “do more with less.” It allows institutions to maximize their limited time and funds. It offers solutions that combat the challenging issues confronting educators. It brings different perspectives, live and interactive, from other countries into the classroom. It offers integrated, flexible distance learning opportunities to achieve educational excellence. It prepares today’s learners to face the world.

The New Pedagogy

Telepresence supports the new pedagogy preparing students as global citizens by providing opportunities for active learning, interactive experiences, access to subject matter experts, collaborative projects, peer and social exchanges, and a deepened understanding of global diversity and interconnectedness. These roles — facilitated by telepresence and other technologies — are often collectively called “curriculum enrichment.”

Content for the enriched curriculum through telepresence comes from multiple sources, including teacher-initiated collaborative projects and content provider programs.

Teacher-Initiated Collaborative Projects

A new learning approach facilitated by telepresence and other distance learning technologies is inter-classroom collaboration initiated by teachers.

Collaborative projects may involve sharing presentations, book reviews, hands-on activities, research initiatives, and other exchanges. By connecting with other classrooms to work on a subject of common interest, teachers are tapping the benefits of peer interaction and social learning. Exploring distant cultures and places is another benefit of such projects.

Substantial learning occurs when educators and students create their own content to share via telepresence. To support this, Cisco sponsors the Kids Creating Community Content (KC3) Contest with the Center for Interactive Learning and Collaboration (CILC). For more information on the contest, visit: http://kc3.cilc.org/index.html.

An excellent resource for finding collaboration partners can be found on the CILC website: www.cilc.org.

Content Provider Programs

Content providers offer educational programs to K–20 schools that are sometimes referred to as virtual field trips. Content providers include museums, science centers, state parks, historic sites, colleges and universities, and medical, government, and community organizations. Their programs on the arts, sciences, history, and other disciplines are usually aligned with state or national academic standards.
Most provide supplemental curriculum materials that assist classroom teachers in preparing students for the program and reinforce the core concepts in the lesson plan. Some content providers will customize their programs to support specialized curriculum or learning needs.

According the figures from one of the nation’s major telepresence content provider databases, there are nearly 200 content providers around the world, many offering programs on a range of topics.

Schools can find content providers through databases and list-serves. Some of these providers charge minimal access fees, while others are free of charge. Using databases such as those of the Center for Interactive Learning and Collaboration (CILC), schools can search by subject or grade level, find other schools interested in collaboration and social learning, and submit requests for specific program topics.

<table>
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<tr>
<th>The Value of Video to Students</th>
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<tr>
<td>• Establishes dialogue and idea exchange among students, educators and subject matter experts regardless of location</td>
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<td>• Class time is used for collaborative student work, experiential exercises, debate, and lab work.</td>
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<td>• Extends access to scarce resources (such as specialized teachers and courses) to more students, allowing them to learn from the best sources and maintain access to challenging curriculum.</td>
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<td>• Enables students to access courses at higher-level institutions, where they can progress at their own pace.</td>
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<tr>
<td>• Prepares students for a future as global citizens. Allows them to meet students and teachers from around the world to exchange their culture, language, ideas, and shared experiences.</td>
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<td>• Enables homebound students to remain engaged with their peers in the classroom.</td>
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### Case Studies

#### Teacher Initiated Projects

**Stamford High School, Stamford, TX**  
Students researched, prepared, and produced a virtual field trip, offered to other schools across the state, which reinforced fundamental knowledge that students already have in geography, history, and science, while giving students hands-on insight into the cotton industry, including the growing and ginning processes.

**White Plains City School District, White Plains, NY**  
Eastview Middle School for the Humanities is working with their sister school in England to develop Youth Summits for Global Harmony. Participating school teams learn how to set up and use the telepresence equipment, integrate other technologies, facilitate programs, initiate new projects, and represent the initiative at public functions. One project included visiting the UN, and developing an interactive distance learning program to share with other participating schools.

### Curriculum Enhancement with Content Providers

<table>
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<tr>
<th>Center for Puppetry Arts</th>
<th>NASA</th>
<th>New York Hall Of Science</th>
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<tr>
<td><strong>Program:</strong> Anansi the Spider: Anansi the Spider: A West African Folktale</td>
<td><strong>Program:</strong> Exploring Space Challenges</td>
<td><strong>Program:</strong> Chemistry Demonstration</td>
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<td><strong>Kinesthetics, dramatic play, and brilliantly colored shadow puppets highlight the beloved African folktale character, Anansi, in this engaging program. As a culminating activity, all students engage in a hands-on activity by creating their own Anansi shadow puppet.</strong></td>
<td><strong>The Challenges model requires students to emulate the same procedures as a scientist when conducting a research project. Students have an opportunity to give their oral presentations to a panel of NASA scientists and educators, for “real-world” feedback. Organizers found that students are more productive, often due to the desire to impress the outside scientists during the videoconference. We also found that teachers are given validation, reporting that their students “finally believe in them” if the same information is provided by outside professionals. Finally, more students are inclined to consider a STEM career.</strong></td>
<td><strong>Have you ever seen a balloon smashed into tiny pieces by a rock, or someone making ice in less than 30 seconds? It may sound impossible, but these are just a few examples of experiments students will see live during the New York Hall of Science’s chemistry demonstration.</strong></td>
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<tr>
<td><strong>The Cleveland Museum of Art</strong></td>
<td><strong>National Science Center</strong></td>
<td><strong>Royal Tyrrell Museum</strong></td>
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<td><strong>Program:</strong> Angles and Answers: Origami and Math</td>
<td><strong>Program:</strong> Careers in Math</td>
<td><strong>Program:</strong> Secrets of the Lost Quarry Journey into the Canadian Badlands and uncover an excavation site forgotten by paleontologists almost 100 years ago — without leaving your classroom! Collect and study the evidence in an effort to find the quarry location, and then discover who worked there and what they found. It’s an interactive adventure you'll not soon forget!</td>
</tr>
<tr>
<td>Students reinforce their knowledge of the vocabulary of geometry and recognize attributes of two- and three-dimensional shapes through an examination of selected geometric-themed works from the museum. Concepts are applied as students create an original origami figure in the shape of a ladybug during the videoconference.</td>
<td><strong>Have you ever thought, “Why do I have to learn this?” The goal of the Careers in Math program is to help students gain a better understanding of how “all that math” they learn in school is used in a variety of careers. Each professional explains how they use mathematics at work. During the second half of the program, students have the opportunity to ask specific questions of the panel members.</strong></td>
<td><strong>Have you ever worked with an expert paleontologist to uncover a mystery dinosaur? How about the opportunity to work as a paleontologist and dig in a quarry? These are just two ways you can participate in the National Science Center’s summer camp program.</strong></td>
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*Updated August 2012*
When selecting programs, schools should look for the following:

- Clear and current information
- Programs aligned with national or state academic standards
- Program ratings and evaluations from educators
- Information about curriculum materials
- Technology requirements
- Any other value-added services such as discounts, professional development, customized content, and collaborative opportunities

See Toolkit #9 at the end of this document for a partial list of telepresence content providers and content provider databases.

Applications for the New Economy

In addition to serving the new K–20 pedagogy, other uses of telepresence at school sites can save money. For example, a Nebraska study found that schools using telepresence could recoup the cost of equipment in 12 months or less.

These applications can meet institutional needs without sacrificing quality and they can expand services at minimal cost. Here's a brief overview of some cost-saving applications for both educational and non-academic purposes:

Full Course Delivery

Delivering semester-long courses via telepresence is a cost-effective solution to offering required classes where students, teachers, or resources are scarce. It can save the expense of transporting students off-campus or hiring additional teachers. As a technology tool, it allows more equitable access for students to limited human resources.

Full-course delivery works at various grade levels — it can be used for middle school students taking a high school course or high school students taking advanced placement or dual-credit courses from a partner school, college, or university. Clearly, it is also a solution that more and more institutions of higher education are employing.

Faculty and Administrative Meetings

Various types of meetings and reviews can be made easier and quicker via telepresence. In higher education, faculty meetings can be conducted without travel between buildings or campuses. Faculty may use the technology to recruit new students, interview job and candidates and students applying for admission, participate in dissertation defenses, and observe classroom instruction. Administrators can easily conduct scheduled and ad hoc meetings, while busy board members can connect with each other via a personal desktop video solution without leaving the campus.

The Value of Video to School District Administrators

- Supports educational equity for isolated schools and campuses.
- Extends scarce resources to a greater number of students.
- Expands curriculum offerings.
- Supports teacher training needs.
- Provides experiences, such as virtual field trips and author discussions, not otherwise available.
- Enables team teaching and collaboration among institutions.
- Supports state and federal performance requirements.
- Supports green initiatives and sustainability efforts.

Case Studies

Full-Course Delivery

**Georgetown County School District, Georgetown, SC**

Finding a sufficient number of accredited honors teachers is difficult, and staffing schools across an 840-square mile area creates significant time and distance barriers for delivering these courses to qualified students. The Georgetown County School District uses telepresence to deliver foreign language, calculus, advanced placement, and other classes to students at all of its schools. Using multipoint technology, a single teacher can interact with two or three locations at the same time.

**Paradise Valley Unified School District, Phoenix, AZ**

The district's first use of telepresence was to bring 15 students together with one teacher for a course that would otherwise not be available due to a lack of resources. From there, the school connected to Internet 2, the advanced network platform for research and public-private partnerships around the world. The district has connected with leading universities throughout the United States, and in China, Taiwan, and Slovakia. These connections are leading to recruitment efforts, guest lectures, joint assessments of student projects, professional development, collaborative team teaching, and more.
A Nebraska study found that schools using telepresence could recoup the cost of equipment in 12 months or fewer, much of that based on savings in travel costs alone.

Nebraska Distance Education Council, 8/15/11, “Calculating ROI for Distance Learning via Videoconferencing”
It is now possible for schools to use much of their already available infrastructure to develop their telepresence.

**Equipment Considerations**

The cost of equipment used to be seen as a major barrier to entry for many schools considering telepresence. But in recent years, those costs have significantly decreased, while quality and availability of a broad range of options has increased.

It is now possible for schools to use much of their already available infrastructure for telepresence purposes.

The devices that educators use to capture and share audio and video interactions in a classroom include:

- Smartphones
- Tablets
- Cameras and other video capture devices
- Simple microphones built in to a phone or tablet
- Separate microphones, from inexpensive to highly sophisticated devices
- Audio from a single source or multiple inputs.

A classroom or viewing site can have a large display, a large screen projector system, or wireless capabilities that allow each student to view the activity on a personal device. A student in an online class or a faculty member involved in professional development can even connect to the interactive program from home and use whatever viewing device is most convenient.

The good news about today’s equipment is that all the technologies are becoming less expensive, more robust, and easier to integrate. Hence, rather than needing to make compromises on the technology that you use, you can affordably put together hardware systems that meet the variety of specific educational challenges.

Another strength of current hardware is that it is more forgiving, allowing for far less emphasis on lighting and audio sound proofing.

In considering hardware, there are a number of issues to assess before making a purchase. For example, if mobility and being able to tape or interact live in ad hoc situations is important, then portable laptops, tablets, and smartphones (with appropriate software) will probably work best.

**Beyond the Basics**

Depending on the type of telepresence that is employed, various hardware devices such as bridges, endpoints and routers may be needed to optimize the network. They allow such functions as multipoint videoconferencing, transcoding among different video standards, and the seamless integration of telepresence and online learning programming. Such tools are becoming much easier to use than in the past.
For a more permanent setup in classrooms, lecture halls, or labs, it may make most sense to integrate an audio and visual hardware solution into the infrastructure that already exists. Utilizing already existing sound systems, smart boards, and already installed multimedia presentation equipment can be extremely effective in reducing fixed costs. Because of the growth in unified communications, the same hardware systems can work both with low-resolution images generated by smartphones and extremely high-resolution images produced by cameras that are becoming less expensive every day.

So, whether a school develops a dedicated system designed specifically for high-end telepresence or chooses to integrate new equipment into already existing systems, there many choices available.

See Toolkit #2 for more information about equipment selection.

Network Considerations

There are several kinds of network technologies that can support telepresence. However, if you already have an IP network in place for voice and data, there are many reasons to run your telepresence applications over that network as well.

With a converged network over IP, the concept of unified communications becomes a reality. With unified communications, separate communications tools are integrated into one system so that they can be used together transparently. Unified communications combines applications and services — such as video, telephony, calendaring, instant messaging, presence, and web collaboration — with any type of communications device and multiple networks for connectivity anywhere, anytime.

As for telepresence, IP promises lower costs, easier management, remote monitoring and control, higher-bandwidth calls enabling higher-quality audio and video, and integration into the corporate information technology mainstream.

According to the research firm Frost & Sullivan, telepresence users switching to IP can reap as much as 40 to 50 percent in savings upon deployment.

On an IP network, the ongoing costs of running a telepresence or video call are minimal — just maintenance and technical support (and you can further minimize those costs with management and scheduling tools). When ROI for the initial deployment is met, any additional conferences are essentially free. And because no incremental cost is involved in running a video conference over IP, employees and managers are more likely to use the technology. As usage goes up, payback times go down, further boosting ROI.

Telepresence over IP increases IT’s control over network management and performance, countering the long-time complaint that video requires significant time and energy investment on the part of IT. Indeed, with lower setup, configuration, resource requirements, and maintenance costs, video over IP makes IT’s job easier.

Administrators can remotely manage telepresence and video conferencing from anywhere, increasing reliability and performance. Video over IP also reduces the cost and time need to train IT staff and end users, and frees IT staff for other strategic initiatives.

The Importance of Broadband

The Federal Communications Commission’s (FCC) Connecting America: A National Broadband Plan, prepared in 2010, highlights the importance of broadband to the security and economic success of our country. Such a robust infrastructure is making it easier to have both telepresence and online learning options available.

In addition to the public network, numerous states have built educational networks. For example, California, Georgia and Utah have dedicated broadband backbones for educational use, all of which are interconnected over the nation’s education and research network, Internet 2.

Telepresence also enables sharing of scarce nonteaching resources such as guidance counselors and school nurses.
Today and beyond, employers want workers with the skills to solve real-world problems in a global economy. This means students must learn how to collaborate using technology that crosses national borders.

IP networks can be easier to benchmark, before and after the installation of telepresence and video conferencing. That is important for performance, especially as more users start to take advantage of the technology. As a result, the technology will run better — and, in turn, will lead to even more usage. Better data and usage information also makes measuring ROI much simpler.

See Toolkit #3 for more information about network considerations.

Key Areas for Success

Telepresence is a powerful tool for enhancing teaching and learning, but it must be built upon a strong foundation in four key areas.

To be successful, telepresence must be supported by an established and well-communicated process for access to:

- Technical support and advice
- Professional development
- Forums for collaboration among teachers and other stakeholders
- Funding opportunities

Support in these areas for K–20 schools varies by state and region and often comes from multiple organizations depending on the service or support required. Various levels of support may be provided by:

- School, district, or county offices of education (or equivalent)
- Regional or state telepresence support organizations (often multifunctional, but with a significant focus supporting telepresence deployment and use of interactive videoconferencing (IVC)
- Organizations operating/supporting a state's educational broadband network
- State Departments of Education

What is most important is that schools strengthen their use of telepresence by tapping into existing support and resources, or create new ones in the key areas for success. Here are some guidelines.

Technical Infrastructure and Support

Telepresence is best viewed as part of a total solution to institutional needs rather than as a standalone technology. Since investing in the technology requires a unified institutional commitment, it is most important that the technical infrastructure is built on a shared assumptions and understanding about operations.

FACTS

A study of 2500 sixth- and eighth-graders in Los Angeles showed a statistically significant increase in math achievement scores when students used streaming digital video on demand.

*Boster, 2004*

The percentage of teachers finding value in multimedia and video content has increased each year since 2007. In a 2010 survey, approximately two-thirds believed:

- Video content stimulates discussions
- Video increases student motivation
- Video helps teachers be more effective


60 percent of all human communications is nonverbal.

*Engleberg, Isa. “Working in Groups: Communication Principles and Strategies”, 2006*
It’s important to consider the costs of technology adoption and operation such as equipment (including upgrades and replacements), network and connectivity fees, training, maintenance, program development and content delivery, and ongoing technical support.

Here are some recommendations for developing a strategic plan in this area:

• Conduct a needs assessment that considers current network and bandwidth capabilities, and staff and funding resources. See Toolkit #1 at the end of this document for a checklist.
• Develop and distribute a sequenced plan for establishing and supporting the technology at school sites. The plan should include standardized guidelines for local networking.
• Standardize and share best practices for implementation, operations, and support at school sites.
• Create and maintain a centralized repository of technical information and support for schools sites with links to related resources.
• Recruit state funded field trainers (“circuit riders”) or partner with telepresence consortia to receive technical assistance, training, and troubleshooting for schools.

Professional Development

Research shows that highly effective educators can also be successful in the virtual classroom. Most of the strategies they already use to engage students can be adapted for telepresence and online teaching. Success with these new tools, however, requires training to build new skills and interest levels around teaching with the technology.

For the greatest impact, professional development should include:

• Sessions to facilitate a basic understanding of connectivity, ease-of-use, and troubleshooting for the equipment
• Methods for integrating interactivity and collaboration into the curricula
• Strategies for facilitating discussions between live and remote sites such as shared projects and hands-on activities
• Information about content providers
• Opportunities for conferences, list-serves, and publications in the field
• Sharing best practices among educators for telepresence use

Tips for finding content and engaging in interactive distance learning and professional development:

• Search the Professional Development Marketplace at www.clic.org
• Approach outside training vendors and groups about their willingness to conduct training via telepresence
• If there is a training resource you want but it does not have the required equipment for telepresence, approach the trainer’s local county office of education or community college. It is possible the center will allow the trainer to use its equipment to conduct the training, and even possible that educators within that school district might be in need of similar training and could participate as well through a multipoint telepresence session.
• Ask other schools within your district if they want to be involved in the training session — and share the cost.

What is most important is that schools strengthen their use of telepresence by tapping into existing support and resources, or creating new ones in the four key areas for success.
According the figures from one of the nation’s major telepresence content provider databases, there are nearly 200 content providers around the world, many offering programs on a range of topics.

See Toolkit #7 for tips on teaching via telepresence. In addition, novices might want to consider participating in the Cisco T4 program (Telepresence Teachers Training Teachers), a professional development package offered to K–20 schools. Led by expert trainers, the workshop provides participants with essential information and strategies for integrating telepresence into the classroom. The program is individualized to meet the specific goals of a school and is a cost-effective way to train a large group of educators and staff. More information is available at: www.cisco.com/web/strategy/docs/education/T4.pdf

Communications and Collaboration

As a technology, telepresence exists for the sole purpose for facilitating communications, interactivity, and collaboration. Users can’t develop telepresence programs or strategies in isolation and then expect to successfully interact with other users. It’s essential that there be sharing among locations before connectivity is established.

See Toolkit #5 for a list of interinstitutional forums where schools with IVC can gather around the virtual table and develop common standards, best practices, and protocols for interschool collaboration.

The groups listed in the toolkit are also useful for:

- Locating content providers
- Collaborating on classroom curricula based on state standards
- Connecting with content specialists in various sectors (‘Ask an Expert’)
- Social networking
- Locating professional development opportunities

“It was just like going to the zoo – even better, ‘cause you could get closer to the animals. You could hear the tigers purring!”

Fresno Elementary School Student
After a virtual field trip to the San Diego Zoo
Users can’t develop telepresence programs or strategies in isolation and then expect to successfully interact with other users. It’s essential that there be sharing among locations before connectivity is established.

**Funding**

There are many funding opportunities for telepresence, and you can find them at the federal and state level and among foundations. Individual institutions can seek funding or can join with other institutions to establish collaborative projects.

By championing their own telepresence success stories, K–20 schools can help increase funding opportunities. “Tooting your own horn” can catalyze interest and action from local and regional areas for statewide support. It is also valuable to collect program evaluations and “testimonial” success stories to include in funding proposals.

Consider also tapping the collective wisdom of your local, state, or national telepresence support organizations for advice and counsel, as well as for leads on funding opportunities and collaborative partners for grants. Many equipment and service providers, including Cisco, offer free grant services that can expedite the process.

Related toolkits:

- See Toolkit # 4 at the end of this document for general advice regarding seeking grants.
- See Toolkit #6 for verbiage on explaining the technology and its applications in the context of federal funding priorities.
- Toolkit #8 provides a list of the benefits of telepresence for use developed by grant writers.

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**FACT**

Many equipment and service providers, including Cisco, offer free grant services that can expedite the process.
About the Authors

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Mr. Theobald has 30 years of experience in telecommunications, most recently as founder of i2i Communications, a new media consulting firm. He specializes in developing applications of videoconferencing and other web video tools for public libraries, schools, and museums. His current and former clients include California Library Literacy Services, the California State Library’s Rural Initiative, California Library Association, Los Angeles County Museum of Art (LACMA), The Getty, Orange County Department of Education, and CENIC (Corporation for Network Initiatives in California).

Dan is the author of CENIC’s “Internet 2: A Primer for California Public Libraries” and co-author of LACMA’s “A Blueprint for Strengthening K-12 Videoconferencing” in California. He also served as LACMA’s delegate to the California K20 California Education Technology Collaborative (K20 CETC).

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John's primary interest is in ePortfolio development. He consults to the California Virtual Campus and the CalState TEACH Project for CSUMB.

Toolkit #1 — Building Your Business Case

The following needs assessment outlines some of the factors you may want to consider when planning your implementation of telepresence. Working through this document may help you quantify costs, quantify benefits, and explore avenues of funding. It also encourages you to think about how to position benefits, such as improved learning, that do not have immediate financial results in the context of your “pitch.”

Business Case Questions and Issues

Describe your school district's current network infrastructure:

- Network connectivity on WAN?
- Network connectivity to regional or state networks?
- How much bandwidth is available for video applications?

Identify your school district's distance learning program needs and opportunities:

- Do you have course delivery, professional development, curriculum enrichment, community or administrative needs?
- Are there funds that can be allocated to support program content costs (budget reallocation and cost savings)?
- Identify professional development needs, based on primary applications.

Evaluate the extent to which the cost of acquiring, using and maintaining visual communication technology will be offset by savings that result from its use:

- Examine cost savings of having some professional development delivered via telepresence instead of always onsite (hard costs, travel costs, and time).
- Examine cost savings of conducting administrative meetings via telepresence versus attending onsite (travel and loss of productivity).
- Compare current spending on offsite field trips and the number of students impacted versus the number of students who could attend virtual field trips and at what cost.
- Compare the cost to provide AP or regular courses out of district or by hiring part-time staff versus the cost to access them remotely.
- Are there community organizations that can utilize the video communications technology, and who, in turn, would pay a usage fee?
- Compile all cost-savings information and compare it with a technology solution estimate that best supports the district’s primary applications (set-top solution versus dedicated-room system).

Investigate the advantages that may not carry a direct financial benefit, but rather a quality-of-education or convenience benefit:

- Weigh the quantity and quality of distance learning content programming accessible to the district that would not otherwise be possible.
- Calculate the number of students who will be impacted by this type of relevant and engaging programming.
- Recognize that there may be an increase in personnel participating in professional development and administrative sessions that occur on personal time with the elimination of travel.

Investigate your organization's funding options for acquiring and maintaining video communications technology:

- Review your annual capital improvement budget and consider the reallocation of dollars saved by departments engaging in distance learning.
- Consider E-Rate and other state, federal, and private funding sources.
Hard Versus Soft Benefits

Hard benefits of telepresence are relatively easy to quantify. An example of a hard benefit is the cost savings of travel and lodging when participants attend a meeting virtually rather than traveling there. Likewise, the cost-savings benefit of content delivery via telepresence can be quantified by looking at line items such as capping salary costs by sharing a teacher among locations, as well as incentives earned from other school sites by sharing your own place-based instructor.

However, quantifying the “soft” benefits of telepresence — where the learning, administrative, or community benefits are undeniable but the return-on-investment is not so evident — presents a challenge in writing business cases or grant proposals. Here are some examples of questions an administrator should ask if looking to quantify the less immediately evident values of telepresence:

- What is the value of improving our teacher “talent pool” by interviewing potential candidates via IVC anywhere in the country, as compared to focusing on local candidates or flying in prospects?
- What is the value of increasing our average test scores and/or graduation rate by offering more classes (including otherwise unavailable AP classes) via telepresence?
- What is the value of strengthening relationships with key community stakeholders by ensuring that all students from all demographic and economic strata have equitable access to educational resources available elsewhere in the state?
- What is the value of developing and sustaining mutually productive working relationships with other administrators in distant locations, who are working on common problems?
- What is the value of providing educational enhancement opportunities (such as author visits and “Ask an Expert” sessions) when otherwise such resources would be unavailable or unaffordable. This issue may be particularly important with the rise of education imperatives such as STEM (Science, Technology, Education and Math), whereby a school can, via IVC, get a jump-start on STEM education while gearing up its own local resources.
- What is the value to the school’s community of attracting new residents and retaining existing citizens by enhancing the educational opportunities available in the local schools?
- What is the value to the school and district of being able to meet federal/state educational policy mandates through virtual teaching tools rather than by adding more expensive place-based resources?
Toolkit #2 — Equipment Selection

Recent advances in technology have greatly increased the options for using telepresence in online learning.

In the past, you needed a dedicated room set up specifically for videoconferencing. Today there are new options for taking advantage of telepresence that can be used in any setting:

- Smart phones
- Tablets
- A sophisticated classroom equipped with a range of tools such as computers and an interactive white board

The devices that educators use to capture both the audio and video interactions in a classroom can range from mobile smartphones and tablets to cameras and other video capture devices. You can use the simple microphones built into a phone or tablet or a separate microphone, ranging from inexpensive to highly sophisticated. The audio can come from a single source or can include multiple inputs run through a switcher or audio board.

Viewing Options

- You can use a video monitor or a large-screen projector system.
- Wireless capabilities that allow each student to view the material on a personal device either in a classroom or at any other site with connectivity
- Faculty members involved in professional development can connect to an interactive program from home and use whatever viewing device they find most convenient.

Good News about Hardware

- Technologies are becoming less expensive.
- Technologies are more robust and easier to integrate.

Current hardware is extremely forgiving:

- There is little need for special lighting.
- Speaker audio can be captured despite ambient sound in the room.

In making hardware decisions, there are a number of issues to consider before you purchase. For example, if mobility and being able to tape in ad hoc situations is important, portable laptops, tablets, and smartphones (with appropriate software) will probably work best. For a more permanent setup in classrooms, lecture halls, or labs, you may want to consider integrating the audio and visual hardware into the infrastructure that may already exist. You can use already existing PA systems, smart boards, and multimedia presentation equipment that are already installed. Because of the growth in unified communications, the same hardware systems can work with low-resolution images generated by smartphones or extremely high-resolution images produced by cameras that are becoming less expensive every day.

So, whether you choose a dedicated system designed specifically for high-end telepresence or you integrate your new equipment into already existing systems, there are many good choices available.
Toolkit #3 — Network Considerations

When selecting your network, you should ask yourself:

- Whom do you plan to call?
- How widely available is the desired network? Not all networks are available worldwide. For example, ISDN is widely available in many countries but is still in the early stages of deployment in some countries and rural areas. The same applies to IP networks. Not all countries or areas are connected to the Internet with the same speed and reliability.
- What are the costs associated with the network? Costs will vary based on your choice of network. If considering an ISDN network, remember that you will have local and long distance charges involved. When looking at an IP network, consider the implementation costs and your existing network architecture. Account for your costs over the long term for each type of network.
- How reliable is the network? It is important to note that public Internet is not as reliable as private IP networks.
- How much bandwidth will you require? Will you use embedded multipoint functions, high-definition video, or other features that require higher bandwidth? You may wish to restrict the bandwidth for certain users or applications, but allow higher bandwidth for your most critical video meetings. You should choose a solution that either allows you to adjust the bandwidth or one automatically balances the bandwidth based on the application.
- Will the solution work with your network partner? High-end video meetings, such as those over immersive telepresence, can benefit from dedicated, managed networks. You should ensure that any solution you choose will work with the network partner you choose.
- Are you operating in a unified communications environment? If you are, you need to build networks that will support varying types of communications systems, devices, and applications, ensuring they can integrate. Inadequate bandwidth capacity, processing bottlenecks, or inappropriate network design can compromise mission-critical applications and negatively affect the adoption of video and other communication tools.

Unified Communications over IP

With a converged network over IP, the concept of unified communications becomes a reality. IP promises lower costs, easier management, remote monitoring and control, higher bandwidth calls enabling higher-quality audio and video, and integration into the corporate information technology mainstream. According to research firm Frost & Sullivan, video users switching from ISDN to IP can reap as much as 40- to 50-percent savings upon deployment.

On an IP network, the ongoing costs of running a telepresence or video call are minimal — just maintenance and technical support (and you can further minimize those costs with management and scheduling tools). When ROI for the initial deployment is met, any additional conferences are essentially free. And because no incremental cost is involved in running a video conference over IP, employees and managers are more likely to use the technology. As usage goes up, payback times go down — further boosting ROI.

Voice over IP increases IT’s control over network management and performance, as well as telepresence and video conferencing. One of the biggest complaints about video has long been that it requires significant time and energy investment on the part of IT.

With lower setup, configuration, resource requirements, and maintenance costs, video over IP makes IT’s job easier.

Administrators can remotely manage telepresence and video conferencing from anywhere, increasing reliability and performance. Video over IP also reduces the cost and time spent training IT staffers and end users, and frees IT staffers for other strategic initiatives.
IP networks can be easier to benchmark, before and after the installation of telepresence and video conferencing. That is important for performance, especially as more users start to take advantage of the technology. As a result, the technology will run better — and, in turn, will lead to even more usage. Better data and usage information also make measuring ROI much simpler.

With unified communications, separate communication tools are integrated into one system so that they can be used together transparently. Unified communications combines applications and services — such as video, telephony, calendaring, Instant Messaging, presence, and web collaboration — with any type of communications device and multiple networks for connectivity anywhere, anytime.

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**Toolkit #4 — Applying for Grants**

Most schools and districts are familiar with the wide range of grant opportunities to help purchase technology — from federal grant-making agencies, to sustained service underwriting organizations such as E-Rate, to private foundations.

To complicate matters further, one size does not fit all when it comes identifying a potential source of funding, researching your “pitch,” or writing the application. Different environments, audiences, technologies, and uses require different tools and approaches in the world of grants. Rather than following a regimented, multistep process, it’s important to tailor your applications to address your specific need, and the specific requirements and interests of the potential funder.

**Support for Getting Grants**

Fortunately, many equipment vendors and service providers understand the challenges involved in navigating the world of grants, and they provide specialized — and usually free — assistance assistance in helping educational institutions win outside funding. These services usually include:

- Needs assessment
- Demographic profile
- Personalized grants planning
- Ongoing Funding notification
- Noncompetitive funding assistance
- Prequalification
- Applications development and submission
- Application tracking and funding notification

Cisco has such a Grant Services team with experts to help schools find and apply for appropriate programs and stimulus funding opportunities, including programs that have a strong record in funding telepresence equipment in the past, such as the Rural Utilities Service (RUS) Distance Learning and Telemedicine grants (DLT).
Tips for Writing Grant Proposals on Your Own

If your school or district wants to pursue the process of writing and searching for grants on your own, consider the following tips:

**Tip #1: Look for Grant OrganizationsFocused on Telepresence**

Your district, county office of education, or regional support organizations will, no doubt, be familiar with most of the major federal and state education technology grants. However, if there is an agency or organization in your state that is particularly focused on telepresence (see Toolkit #5), check with them as well, as they may be familiar with more specialized opportunities.

**Tip #2: Be Specific**

Avoid making general statements. Grant seekers often find themselves disoriented after trudging through terabytes worth of research in preparation for a grant proposal. The Internet makes it incredibly easy to access information, yet many grant proposals that are submitted lack specificity, proof of research, and numerical support.

**Tip #3: Quantify the Issues**

Grant narratives that make sweeping statements about target communities fall flat with readers. There is an abundance of information and data resources on the web that grant seekers can use to provide numerical support and lend credibility to grant narratives.

For example, rather than simply stating that students in your community come from mostly low-income families, grant seekers should cite, for example, facts like the following: “At [name of school], 75 percent of students qualify for the Free and Reduced School Lunch Program,” a standard barometer for measuring poverty. Alternatively, the percentage of families living below the poverty line or the community-specific median household income from the United States census could be used to lend numerical support to the grant narrative.

**Tip #4: Cite Research**

It is an all-too-common assumption that the grant reviewer will understand that your project design has been thoroughly researched and is based upon proven practices. Grant seekers often submit proposals that lack any mention of a developmental or planning phase at all and the reader is left to assume that the project design is ill-conceived or scientifically baseless.

Grant seekers can easily avoid this assumption by discussing the steps that they took to incorporate relevant research into the design of the proposed program. For example, it is not effective to state simply that computers raise student achievement. There have been countless studies linking the use of computers to increased academic achievement. You can even find specific studies by grade, ethnicity, income level, state and more. Remember that the more specific the research is to your particular project, the more it will resonate with grant reviewers. Studies linking the use of computers to increased academic achievement. You can even find specific studies by grade, ethnicity, income level, state and more. Remember that the more specific the research is to your particular project, the more it will resonate with grant reviewers.
Toolkit #5 — Accessing Support and Collaboration Organizations

The peers you normally network with within your school or district may not necessarily be using telepresence, or even be very familiar with it. To find local, state, or national interactive videoconferencing (IVC) champions, you may need to extend your social network a bit further in order to get help with questions, issues, or opportunities.

Fortunately, there are many support organizations available, from the national level down to statewide and regional level. All, to various extents, are involved in support and advocacy efforts to facilitate increased telepresence adoption in the schools, and to enhance the use of this technology through services, support, and coordination.

Services provided vary widely from organization to organization, but can include:

- Technical troubleshooting and advice (usually in collaboration with local IT staff)
- Lists of local and regional content providers, and links to other content databases
- Facilitation of interschool collaboration
- Professional development and “how-to” resource archives
- Contact media, such as member lists, listservs, Facebook pages, Twitter accounts, and so on

This toolkit provides a partial list of national and state-level telepresence associations. If there is a state-level group in your state, you might inquire if there is also a regional or local support group for your specific geographic area. The Center for Interactive Learning and Collaboration (CiLC), a national organization, is also an excellent source for information about local contacts in your area.

Also listed is the leading national listserv for telepresence use in the schools, along with a blog that addresses many basic classroom “best practices.” The blog may be expanding in the future to comment on additional educational technology, but the blog archives are an excellent resource for grassroots information.

**LISTSERV**
K12IVC (operated by CiLC)
www.cilc.org/c/misc/k12ivc.aspx

**BLOG**
Videoconferencing Out on a Lim
http://vcoutonalim.org/

**SUPPORT ORGANIZATIONS: NATIONAL**
Center for Interactive Learning and Collaboration (CiLC)
www.cilc.org
## SUPPORT ORGANIZATIONS — STATE

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Toolkit #6 — Telepresence and Alignment with National Education Priorities

Many state agencies are interested in pursuing funding for comprehensive telepresence networks through federal grant programs. The following offers some ideas regarding how distance learning via telepresence fits perfectly with many policies and priorities of the federal Department of Education and other important grant-making agencies and foundations.

Focus 1 — Student Success

A) Increasing student achievement in reading/language arts and mathematics (at a minimum), as reported by the NAEP and the assessments required under the ESEA.

- Telepresence can increase student achievement in core curriculum areas. Enhancing the curriculum, team teaching, supplementing lesson plans with virtual field trips and collaborative activities and tried-and-true uses for interactive video are all useful tools.
- Using distance learning technologies, teachers can team teach subjects and reach students in different ways. What resonates with one student might not work for another, and utilizing individual teacher’s areas of expertise can improve the total number of students who understand key concepts.
- Telepresence can help you go above and beyond the minimum reading/language arts and mathematics requirements by enabling you to bring in higher-level specialty subject instructors more cost effectively.

B) Decreasing achievement gaps between subgroups in reading/language arts and mathematics, as reported by the NAEP and the assessments required under the ESEA.

- Telepresence can help bring extra resources to underperforming students, as well as provide them with the opportunity to have one-on-one assistance and tutoring at significantly less cost than paying for specialists’ travels.
- Telepresence can bring additional content to your students, enabling you to reach underperforming students in new ways that will enhance their love of learning. For example, virtual fieldtrips to the Baseball Hall of Fame can make learning averages fun and exciting as students calculate players’ batting averages.

C) Increasing high school graduation rates.

- Telepresence can encourage lagging students to take part in credit recovery courses by providing classes during non-traditional times (i.e. weekends, after school, during the summer).
- Telepresence can increase students’ love of learning from an earlier age and increase the likelihood of students staying in school.
- Telepresence can bring in specialty courses that will enable students who are not on a traditional graduation path to have access to classes that may be of more interest and will help ensure that the student continues to learn a trade or job skill.

D) Increasing college enrollment

- Telepresence can facilitate dual-credit courses for high school juniors and seniors because students can take part in college level courses from their home locations.
- Students will be more inclined to continue on to college if they are successful in dual- credit classes from the comfort of their local high school.
- Telepresence can increase the number of students who complete at least a year’s worth of college credit, which is applicable to a degree, within two years of enrollment at a higher education institution.
Focus 2 — Increase Capacities

A) Providing strong leadership and dedicated teams to implement the statewide education reform plans that the state has proposed.

• Ensuring a team is strong and effective requires communication. State administrators can use telepresence to meet more frequently and with significantly less cost than physically traveling to one central location.

• Numerous studies demonstrate that communication is most effective when both audio and visual means are available.

B) Supporting participating LEAs by successfully implementing the education reform plans the state has proposed, through such activities as identifying promising practices, evaluating their effectiveness, ceasing ineffective practices, widely disseminating and replicating the effective practices statewide, holding participating LEAs accountable for progress and performance and intervening where necessary.

• Administrators can easily meet via telepresence to discuss practices in need of revision as well as how to reinforce current and/or future “best practices”.

• Successful practices can be recorded, stored, and distributed to anyone with an Internet connection by using network infrastructure such as a content server.

C) Providing effective and efficient operations and processes in such areas as grant administration and oversight, budget reporting and monitoring, performance measurement tracking and reporting and fund disbursement.

• Administrative and budget meetings can be held by telepresence, decreasing the time and money required to transport all necessary officials to one location.

• The same infrastructure that makes multiple meetings possible can also be used by individual districts, schools and teachers to enhance the curriculum and directly improve student achievement.

D) Using the fiscal, political and human capital resources of the state to continue, after the period of funding has ended to pinpoint reforms funded by the grant and to highlight “evidence of success”.

• After your state has made an initial investment in telepresence infrastructure, you will be able to use that equipment for years to come — far beyond the lifetime of the grant period.

• Maintenance on most telepresence equipment can be subsidized by E-Rate and Basic Maintenance funding, ensuring that your schools will have minimal out-of-pocket expenses in keeping telepresence equipment up and running after a grant expires.

Focus 3 — Broad Support

A) Including the state’s teachers and principals, as well as the state’s teachers’ unions or statewide teacher associations.

• Teachers, principals, unions, associations and other key stakeholders can easily participate in all pertinent meetings, activities and projects with minimum time and travel expense.

• Top administrators can easily communicate with all stakeholders on the progress the state is making towards meeting outlined targets and benchmarks of success, as well as redirect efforts when anticipated success is elusive.

• Improved communication among teachers, principals, unions and associations can increase the number of professional development and mentoring opportunities. Better teachers will result in better students!
B) Including other critical stakeholders, such as the state’s legislative leadership, charter school authorizers and state charter school membership associations (if applicable), other state and local leaders (e.g., business, community, civil rights and education association leaders), Tribal schools, parent, student and community organizations (e.g., parent-teacher associations, nonprofit organizations, local education foundations and community-based organizations) and institutions of higher education.

- Schools can be community resources as well as student and teacher resources. Including community education (i.e. ESL classes for non-native English speakers, workforce training and development, nutrition, diabetes, H1N1 and other health-related educational workshops) will lead to a better and more supportive learning environment for students. Telepresence can provide all of this content most cost-effectively.
- Community activities, like recording verbal histories, to enrich the learning environment for students, as well as encourage community involvement in the school system.
- Telepresence can create convenient links between and among students and local business leaders. These personal relationships, especially mentoring opportunities facilitated by telepresence, can prepare students for the workplace after graduation.

Focus 4 — Common Standards

A) Developing and adopting common standards by participating in a consortium that supports the transition to enhanced standards and high-quality assessments.

- When a consortium adopts telepresence, stakeholders from across a multi-state region can meet more frequently and without the restraints imposed by travel budgets or excessive travel times. More coordination and interaction inevitably results in more responsive leadership that is able to more easily analyze the effectiveness of the overall program goals, react quickly to eliminate unsuccessful practices and disseminate successful practices to the entire partnership.
- Using telepresence across a broader geographic area opens students up to additional opportunities not currently available in their immediate area.
- Students who have the opportunity to interact with other students expand their world of words and increase their love of learning. Lessons that incorporate telepresence are more engaging than “talking-head” lecture classes.

B) Enacting a plan for supporting a statewide transition to, and implementation of, internationally benchmarked K–12 standards that build college and career readiness by high school graduation, and provide the high-quality assessments tied to these standards.

- Telepresence will enable the state and LEAs to adopt methods of combining synchronous and asynchronous learning methodologies into one comprehensive program. These high-quality instructional materials will speak to this new generation of technology-savvy students who are used to and expect 21st century technologies to be a part of their learning environment.
- High-quality Professional Development (PD) is easily delivered via telepresence.
- By allowing teachers to stay at their home schools and by minimizing professional developer’s travel expenses, the state and LEAs will be able to offer more effective professional development to teachers.

Focus 5 — Great Teachers and Leaders

A) Providing high-quality pathways for aspiring teachers and principals to participate in a process for monitoring, evaluating and identifying areas of teacher and principal shortage, and for preparing teachers and principals to fill these areas of shortage.

- Telepresence can provide opportunities for teachers and principals to share resources and provide a peer support system across large areas to help prepare them to fill areas of shortage. For example, a new principal could fill a shortage area and video could provide that crucial link to someone more experienced, which could lead to a better experience for the new principal, the students and the teachers.
B) Enhancing the skill set of teachers and principals by providing relevant coaching, induction support and/or professional development.
   • Telepresence can provide the opportunity to receive relevant coaching, support and professional development training. Additionally, using video to connect teachers and principals to coaches and professional development providers after the initial training can increase the rate of success through appropriate follow-up.

C) Compensating, promoting and retaining teachers and principals, including providing opportunities for highly effective teachers and principals to obtain additional compensation by giving them additional responsibilities.
   • Excellent teachers want access to the best teaching tools and support available. Telepresence is a key teaching tool that will entice teachers to stay at their school and continue to be effective in their classrooms.

D) Removing ineffective tenured and untenured teachers and principals after they have had ample opportunity to improve, and ensuring that such decisions are made using rigorous standards and streamlined, transparent and fair practices.
   • Telepresence is an effective tool for providing opportunities for ineffective teachers to improve. By recording classes, teachers and their coaches and mentors can break down a teacher’s strengths and weaknesses, and can enable the teacher to get feedback to improve his or her effectiveness.

E) Ensure the equitable distribution of teachers and principals by developing a plan, based on reviews of prior actions and data, to ensure that students in high-poverty and/or high-minority schools have equitable access to highly effective teachers and principals, and to ensure that these students are not served by ineffective teachers and principals at higher rates than any other students.
   • Telepresence can provide high-poverty/high-minority student populations with supplemental content that will facilitate existing content in a culturally appropriate manner. By providing the multiple alternative teaching methodologies available over video, teachers will become more effective in reaching those traditionally lower-performing students.

F) Increase the number and percentage of effective teachers teaching hard-to-staff subjects and specialty areas, including mathematics, science and special education, language instruction educational programs (as defined under Title III of the ESEA) and other areas as identified by the state or LEA.
   • Telepresence will enable effective teachers in hard-to-staff subjects and specialty areas to reach more students by teaching online, as well as provide support for newer teachers so that they, too, can become more highly effective instructors.
   • Telepresence also enables teachers of hard-to-staff subject areas to further their own education and expertise in these courses by giving them access to higher education (i.e. masters and doctoral programs) easily available online.

G) Providing effective, data-driven professional development, coaching, induction and common planning and collaboration time to teachers and principals who are, where appropriate, ongoing and job-embedded. Such support might focus on gathering, analyzing and using data, designing instructional strategies for improvement, differentiating instruction, creating school environments supportive of data-informed decisions, designing instruction specific to the requirements of high-needs students and aligning systems and removing barriers to effective implementation of practices designed to improve student learning outcomes.
   • Professional Development is conveniently and cost-effectively available via telepresence. LEAs can record PD sessions for use and review over an extended period of time, which enables the districts to bring in a wider variety of PD opportunities to improve teacher performance.
**Toolkit #7 — Teaching via Telepresence**

Of all the distance teaching technologies, telepresence is the most similar to classroom instruction. However, there are a few key differences in the teaching and learning process that require attention for faculty and students to use telepresence successfully.

The most important thing to remember for teachers instructing via telepresence is that they are not teaching to TWO classes (one locally, one at a distance) – they are teaching to ONE class which just happens to be geographically distributed. The goal is to include both groups in the same learning experience. Interactivity should be among all students both within and between both sites, and between the instructor and students at both sites. You may need to go out of your way to facilitate interaction between the local and remote location.

The following tips pertain primarily to the instructional mechanics of conducting a class or course telepresence. For more information on lesson planning, instructional design, and evaluation, see: www.kn.pacbell.com/vidconf/instruct.html.

**What should I do before my first class session?**

- Learn to operate the equipment without assistance. Run a test session with the locations that will be connecting to your classroom so you are sure that all of the remote sites have the right setup. The most common setup problems involve lighting issues (too dark, washed out, glare), and microphone placement.

- Prepare a videoconferencing etiquette summary for your students so they know not to tap their pens on the table, shuffle papers, place materials on top of the microphone, or create other disruptions. Also let them know that they should mute their microphones when not speaking.

- Have a backup plan in case the technology fails. A good option is dialing into a speakerphone at the remote location so you can continue your class without much of an interruption.

- Arrive 15 minutes before each class session to ensure that the equipment is set up correctly and to establish the connections with the other locations.

- Provide an agenda and handouts in advance. Clearly title each handout and number the pages, so students will be able to find the right place if you refer to a handout during the class.

- Anticipate name, titles, definitions, and URLs that students might need spelled out during the presentation, and provide those on a handout.

- Plan to encourage engagement and interaction. Pose questions on your agenda so that students will be thinking about issues in advance; plan for break-out groups, with each group reporting back to the whole class.

**How can remote students be encouraged to ask questions and participate in discussion?**

- Begin your class with some sort of activity or exercise that demonstrates the interactive nature of the technology. Students must learn as soon as possible that they are not watching television – they are engaged in a live interactive experience.

- Let your students know the protocol for asking questions. Do you want them to interrupt you as you’re speaking (with a question or a raised hand) or will you allow certain times for questions?

- Learn the names of your remote students and ask them discussion questions directly.

- Give the remote students seed questions to ask in class to kick off a discussion or to periodically lead the class in the discussion of a particular reading or case study.

- Let remote students mute their microphones and have their own course-related discussion. Some instructors dislike this practice, but it can help the remote student group form a support community.
• Remote students may have trouble jumping into a heated classroom discussion since body language that indicates that they want to speak is less noticeable. The audio and video signal may also be delayed by a second or two, which makes students feel out of synch with the main presentation. Go out of your way to give them the opportunity to present their views.

• Small group discussion activities with a report-out time encourage students at all locations to discuss a topic and express their thoughts. They also give students a break from passively watching a presentation.

• Ask questions of the remote sites to spark response and interactivity

• Allow for interaction among the sites, as well as between each site and presenter. If a question is posed to you, consider tossing it to one of the other remote sites for an answer

• Compliment learners when they ask questions

• Try to connect several learners’ comments or questions, citing similarities or differences among them.

• Encourage, but don’t embarrass, shy students who may be comfortable interacting with their peers at their local site, but not with the remote locations. Consider building one or two local exercises in your session, where the participants at each site interact with their local peers and report back to whole group at the end.

• If you know in advance that a participating site has some insight or experience with the topic, call on that site to report out on their experience, thus facilitating discussion, demonstrating the interactive nature of the technology, and giving a visual “break” from the teacher’s talking head.
Toolkit #8 — Benefits of Telepresence in the Schools

Telepresence offers multiple benefits to schools, universities, content provider organizations, and support consortia. In 2008, national leaders in the field of distance education convened at the Los Angeles County Museum of Art and identified the top three benefits of telepresence:

- Maximizing budget
- Increasing access and equity
- Expanding learning

This toolkit describes these primary benefits of using telepresence.

Maximized Budget

- Reduce travel time and expense associated with various teaching, staff professional development, and administrative activities.
- Enables schools, universities, content providers, and consortiums to share the cost of programming and resources.
- Supports “green” sustainability efforts.
- Provides content providers with cost-efficient means to extend institutional missions and programs, reaching beyond an onsite event.
- Can provide additional revenue streams.
- Cost-effectively increases public awareness and reach globally through expanded access to people, programs, and content.

Increased Access

- Dissolves geographic boundaries, creates exciting virtual field trips to remote sites, and provides increased equity for all learners.
- Extends educational resources into locations where few exist due to location or funding.
- Enables homebound or off-campus students to be included and engaged.
- Reduces isolation for educators in remote regions, educators who are the sole subject-matter expert in their school, or early-service teachers who need mentoring.
- Provides educational equity for schools and campuses that are isolated due to funding or location.
- Expands curriculum offerings and increases numbers served.
- Demonstrates an institution’s commitment to providing unique and equitable learning experiences.
- Exposes audiences to existing educational programs that would not be accessible without video communication technologies.
- Can be used to market onsite events and attract audiences to the institution.
Expanded Learning

- Provides live interaction with experts not otherwise available, increases social learning and collaborative opportunities, and facilitates global awareness.
- Establishes a dialogue and exchange of ideas between students, educators, and subject matter experts who have different viewpoints, experiences, and strengths.
- Prepares students for a future as global citizens, proficient in emerging technologies.
- Addresses multiple learning styles when distance learning is combined with traditional methods of instruction.
- Enables advanced or special needs students to take advantage of learning opportunities that the school alone cannot provide due to a lack of staffing, funding, or expertise.
- Provides opportunities for social learning and for students to collaborate with peers from many cultures and communities.
- Increases interaction with colleagues and peers.
- Provides access to resources and information not traditionally available, resulting in more relevant and engaging learning experiences.
- Provides experiences that schools might not have had access to through traditional field trips.
- Enables team teaching and collaboration between institutions.
**Toolkit #9 — Telepresence Content Providers**

This is a partial list of telepresence content providers, as well as databases for locating content resources and details specific to your classroom needs. It contains links that were active as of August 2011. The content providers are listed alphabetically, but include institutions representing the subject matters areas of classic and contemporary art, music and theater, history, science, agriculture, zoology, film and television, and much more.

Some of the providers offer their programs for free. Others may charge in the range of $75 - $200 per class. See the individual listings, or check the databases, for more information.

Many state and regional telepresence support organizations also maintain databases of content providers, usually focused on local and regional cultural, scientific, and historical resources. See Toolkit #5 for a list of some of these organizations.

**National Telepresence Content Provider Databases**

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<th>Center for Interactive Learning and Collaboration (CILC):</th>
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<td><a href="http://www.vccontentproviders.org">www.vccontentproviders.org</a></td>
<td><a href="http://www.cilc.org">www.cilc.org</a></td>
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**Sample List of Telepresence Content Providers**

- **ACT Out Ensemble:**
  http://actout.org/about.html

- **Adler Planetarium and Astronomy Museum:**
  www.adlerplanetarium.org/education/distancelearning/

- **Adventure Science Center:**

- **Adventures In Medicine & Science (AIMS) of Saint Louis University:**
  http://aims.slu.edu

- **Akron Zoo:**
  http://akronzoo.org/

- **Alaska SeaLife Center:**

- **Albany Institute of History and Art:**
  www.albanyinstitute.org/z%20AlHA%20website/7Education/Videoconferencing/education.videoconferencing.htm

- **Alberta Museum:**
  www.royalalbertamuseum.ca/edu/programs/program.asp?program=distance%20learning

- **Alberta Parks:**
  www.albertaparks.ca/edvc.aspx

- **Alter Enterprise Wildlife Viewing:**
  www.inspiredclassroom.com

- **American Labor Museum/Botto House National Landmark:**
  www.labormuseum.net/DistanceLearningClasses.html

- **Amon Carter Museum of American Art:**
  www.cartermuseum.org/teaching/distance-learning

- **Ann Arbor Hands-On Museum:**
  www.aahom.org/programs/distance_learning/

- **ANU School of Music:**
  http://music.anu.edu.au/

- **AT&T Park, Home of the San Francisco Giants:**
  http://sanfrancisco.giants.mlb.com/sf/ballpark/distance_learning.jsp

- **ATHENA Excellence in Cities Education Action Zone:**
  www.athena.bham.org.uk/

- **Badlands National Park:**
  www.nps.gov/badl/forteachers/distancelearningopportunities.htm

- **Bamfield Marine Sciences Centre:**
  www.bms.bc.ca/computing/videoconf/index.html

- **Bass Performance Hall:**
  www.basshall.com

- **Battleship New Jersey:**
  www.battleshipnewjersey.org/education/distance_learning.php

- **Boonshoft Museum of Discovery:**
  www.boonshoftmuseum.org/plan-your-visit/educators/distance-learning
Bronx Zoo/Wildlife Conservation Society:

Buffalo Museum of Science:
www.sciencebuff.org/programs/school-programs/distance-learning/

Buffalo Zoo:
www.buffalozoo.org/distance_learning.html

California State Parks:
www.parks.ca.gov/

Calvert Marine Museum:
www.calvertmarinemuseum.com/education/education-distance-learning.php

Camden Children’s Garden:
www.camdenchildrensgarden.org/education.html

Canadian Museum of Nature:
http://nature.ca/education/cls/vc/indexvc_e.cfm

Canadian Space Agency:
www.asc-csa.gc.ca/eng/educators/tele-learning/default.asp

Cape May County Park and Zoo:
www.capemaycountygov.net/Cit-e-Access/webpage.cfm?TID=5&TPID=2763

Carnegie Museum of Natural History:
www.carnegiemnh.org/programs/distance.html

Center for Puppetry Arts:
www.puppet.org/edu/distance.shtml

CESA 7 Interactive Learning Services:
www.cesa7.org/ets/

Challenger Learning Center, Brownsburg:
http://challenger.brownsburg.k12.in.us/html/vc.html

Challenger Learning Center, Center for Educational Technologies:
http://e-missions.net/

Cincinnati Art Museum:
www.museumvideoclassroom.org

Cleveland Botanical Garden:
www.cbgbgarden.org/

Cleveland Institute of Music:
www.cim.edu/dl/programs/

Cleveland Metroparks Zoo Website:
www.clemetzoo.com/education/dstlrn/distlearn.asp

Cleveland Museum of Natural History:
www.cmnh.org

Columbia Gorge Discovery Center and Museum:
www.gorgediscovery.org/educationTourGroupsElectronicsFieldTrip.html

Columbus Zoo and Aquarium:
www.colszoo.org/the_zoo_to_you/distance_learning/default.aspx

COSI Columbus:
www.cosi.org/educators/education-programs/electronic-education/

Cranbrook Institute of Science:
http://science.cranbrook.edu/for-teachers/distance-learning/science-screen

Denver Museum of Nature and Science:
www.dmns.org/teachers/at-your-school

Downtown Aquarium Houston:
www.aquariumrestaurants.com

FASNY Museum of Firefighting:
www.fasnyfiremuseum.com/

Fort Worth Museum of Science and History:
www.fwmuseum.org/distance-learning

George Eastman House:
www.eastmanhouse.org/education/k-12/distance.php

George Washington’s Mount Vernon Estate:
www.mountvernon.org/learn/teachers_students/index.cfm/pid/1161/

Grand Canyon National Park:
www.nps.gov/grca/forteachers/distancelearningopportunities.htm

HEC-TV:
www.hectv.org/

Hoover Presidential Library:
www.hoover.archives.gov

Independence Seaport Museum:
www.phillyseaport.org/

Indianapolis Zoo:
www.indyzoo.com/SitePages/Education/distanceLearning.aspx

Intrepid Sea, Air & Space Museum:

Kings County Office of Education:
http://videoconferencing.kings.k12.ca.us
Liberty Science Center:
www.lsc.org/lsc/edprograms/studentprograms/ef

Library of Congress:
www.loc.gov/teachers/

Los Angeles County Museum of Art:
www.lacma.org/programs/
TeachersSchoolsDistanceLearning.aspx

Louisville Science Center:
www.louisvillescience.org/site/teachers-distance-learning/

Lower East Side Tenement Museum:
www.tenement.org

Manhattan School of Music:
http://dl.msmnyc.edu

Megaconference Jr.:
http://megaconferencejr.org/

Michigan State University Museum:
http://museum.msu.edu/ProgramsandPartnerships/Educational/VirtualOutreach/

Mid-Atlantic Center for the Arts:
www.capemaymac.org/education/distance/index.html

Milwaukee Public Museum:
www.mpm.edu/education/distance/

Minnesota Historical Society:
www.mnh.org/ivc

Museum of Contemporary Art- Sydney:

Museum of Science and Industry:
www.msichicago.org/

National Baseball Hall of Fame:
http://baseballhall.com/education/school-programs/videoconferences

National Coal Mining Museum:
www.ncm.org.uk/displaypage.asp?id=91

National Cowgirl Museum and Hall of Fame:
http://cowgirl.net/home/home/education/school-services/school-tours/

National Library of New Zealand:
www.natlib.govt.nz/

National Maritime Museum:
www.nmm.ac.uk/

National Museum of Australia:

National Portrait Gallery:
www.npg.org.uk/live/edvideoconf.asp

National Space Centre:
www.spacecentre.co.uk/Page.aspx/83/VIDEO_CONFERENCEING/

Natural History Museum in London:
www.nhm.ac.uk/education/index.html

Neil Armstrong Air and Space Museum:
www.nasa.org/w reaff/teachers/teachers.html

New Jersey Academy for Aquatic Sciences:
www.njaas.org/index.html

New York Hall of Science:
www.nysci.org/

New York State Historical Association and the Farmers’ Museum:
www.nysha.org/for_teachers/distance_learning

North Carolina Museum of Natural Sciences:
www.naturalsciences.org/education/programs/distance-learning-programs

North Carolina State Museum of History:
http://ncmuseumofhistory.org/edu/DistLearn.html

Northern Michigan University:
http://av.nmu.edu/k12.htm

Ocean Institute:
www.ocean-institute.org/

Ocean of Know:
www.oceanofk.org

Ohio Historical Society:
www.ohiohistorical.org/dl

Ontario Science Center:
www.ontariosciencecentre.ca/

Oregon Museum of Science and Industry:
www.omsi.edu/

Paley Center for Media (Formerly The Museum of Television and Radio, NY):
www.paleycenter.org/videoconferencing

Philadelphia Museum of Art:
www.philamuseum.org/education/32-128-195.html

Pro Football Hall of Fame:
www.profootballhof.com/hall/DistanceLearning.jsp

Railroad Museum of Pennsylvania:
www.museum.pennsylvania.edu/education/Education%20Catalog%20Web.pdf

Rock and Roll Hall of Fame and Museum:
www.rockhall.com/distancelearning/

Royal Botanical Gardens (Canada):
Royal Tyrrell Museum of Paleontology:  
www.tyrrellmuseum.com/programs/distance_learning.htm

Saint Louis Zoo:  
www.stlzoo.org/education/outreachprograms/videoconferencingprograms.htm

San Diego Zoo:  
www.sandiegozoo.org/teachers/video_index.html

Seacoast Science Center:  
www.seacoastsciencecenter.org/programs/distance_learning.php

Sixth Floor Museum at Dealey Plaza:  
www.jfk.org/

Smithsonian American Art Museum:  
http://americanart.si.edu/education/video/

Smithsonian Environmental Research Center:  
www.serc.si.edu/education/dl/

Smithsonian National Air and Space Museum:  
www.nasm.si.edu/education/classroom_videoconf.cfm

Space Center Houston:  
www.spacecenter.org/distancelearning.html

Te Papa Museum:  
www.tepapa.govt.nz/Education/VideoConferences/Pages/default.aspx

Tennessee Aquarium:  
www.tennis.org/KidsTeachers/Distance_learning.asp

Texas State Aquarium:  
www.texasstateaquarium.org/index.php?option=com_content&view=article&id=22&Itemid=42

Texas Wildlife Association:  
http://texas-wildlife.org/index.php?option=com_content&view=article&id=167&Itemid=166

The Holocaust Centre:  
www.holocaustcentre.net

The Holocaust Memorial and Education Center of Nassau County:  
www.holocaust-nassau.org/#pageID=474

The Mariners' Museum:  
www.marinersmuseum.org/education/distance-learning

The National Archives at Fort Worth:  
www.archives.gov/southwest/education/distance-learning.html

The Newark Museum:  
www.newarkmuseum.org/EducationPrograms/EdcuationPrograms.aspx?id=1820

The Solomon R. Guggenheim Museum:  
www.guggenheim.org/new_york_index.shtml

The Toledo Zoo:  
www.toledozoo.org/edzoocation/distance.html

U.S. House of Representatives:  
www.house.gov

U.S. National Archives and Records Administration:  
www.archives.gov/nae/education/workshops/video-topics.html

U.S. Senate:  
www.senate.gov

Vanderbilt Virtual School:  
www.vanderbilt.edu/virtualschool/