



TelePresence in Education

Introduction

Whether we are talking about teaching or learning, there is no doubt that communication systems are changing. Educational institutions are augmenting the traditional settings of bricks and mortar by providing virtual learning tools and building virtual learning communities. This enables students to connect with educators and other students in an unprecedented manner.

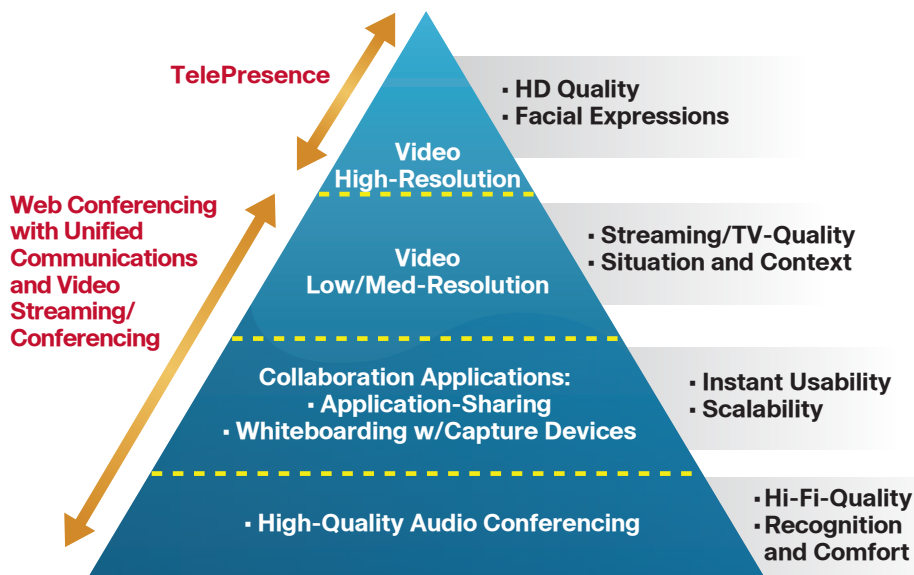
Emerging technologies such as Cisco® TelePresence are enabling this change. Cisco TelePresence can underpin future changes in teaching and learning environments by merging the potential of student-centered learning methodologies with interactive, rich media to create a new form of collaborative educational experience.

Need

The need for a more enriching learning experience is coming from multiple fronts. Educators are increasingly recognizing the power of communication and collaboration tools not only for teaching and learning in situ but also for distance learning and interaction with remote peers. Additionally, students have come to expect the latest in rich media and interactive technologies. As a result, educational institutions are under tremendous pressure to attract and retain students, and thus must offer a broad range of rich media services. These services also increase the potential for increased participation and deeper engagement by students studying at a distance. Since communication, collaboration, and digital content are the fundamental building blocks of engaging, rich-media learning environments, educational institutions need a technology that combines engaging interactions with the latest teaching methods. Cisco TelePresence is such a solution.

Cisco TelePresence

Although existing video conferencing systems allow participants to see and hear each other, the design is not based on the way people naturally interact. There is no sense of being in the same room with other participants due to poor audio quality, poor image resolution, and the small size of the picture. Eye-to-eye contact is commonly absent due to misplaced cameras. At best, video conferencing achieves "situational awareness" of what is happening in a remote location, but cannot convey facial expressions. Furthermore, video conferencing is limited by its difficulty of use and spotty connectivity success, particularly for some faculty who are not technically savvy.



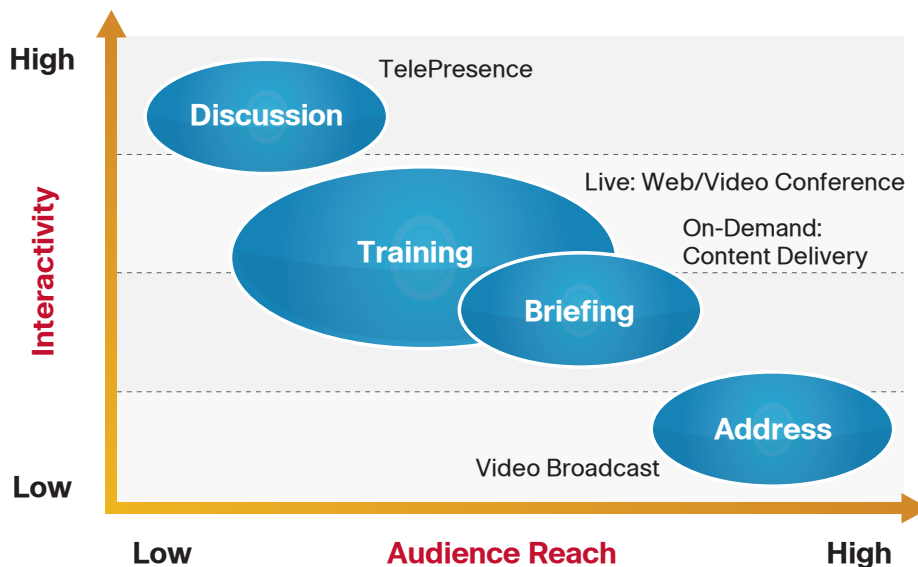
Cisco TelePresence is significantly different from existing video conferencing systems. Cisco TelePresence enables eye-to-eye contact between participants as well as allowing participants to observe nonverbal cues. Through the use of multiple video cameras and screens, students and educators are able to see one another at the same time they are viewing shared video, and are able to conduct an electronic dialogue without the constraints of time and place. Such group brainstorming can be the most rewarding and productive educational experiences of all and provide the essential teamwork skills required by today's business world. Additionally, research teams on cross institution and transnational projects can save traveling time and money for brainstorming and development meetings.

Cisco TelePresence is what video conferencing has been promising for two decades. The quality of the audio and video, the size of the images, and the specially tuned environment are designed to make participants feel as if they are all sitting around the same table, despite being thousands of miles apart. With Cisco TelePresence, the image resolution is up to ten times better than existing video conferencing, and voice and video are synchronized.

Cisco TelePresence rooms are carefully designed, complete with lighting, furniture, and acoustic details to support a virtual learning environment. Cisco's solution for camera placement at eye level provides the most effective method of delivering eye contact, gaze perspective, and the dynamics of human meeting within the practical limits of the two-dimensional world. Critically, audio is high-fidelity and directional as well, further enhancing the sensation of same-room presence as well as increasing intelligibility overall.



For educational institutions, Cisco TelePresence is about more than video conferencing. It provides access to a virtual learning environment that makes students feel like they are in the same room as their educator and other students, for collaborative work in different cities, states, and countries. The choice of medium will be dictated by the combination of audience size and level of interactivity, per the diagram below:



Enhancing the Virtual Classroom Experience

New communication technologies such as Cisco TelePresence are blurring the differences between traditional and virtual teaching and learning. Cisco TelePresence is a technology that simulates the human experience and, therefore, the design of Cisco TelePresence encapsulates both the engineering and psychological elements of human behavior.

Meeting human factor requirements is fundamental in the product and system design, which results in the creation of a two-way visual communication experience that makes the participants feel like they are sitting across from each other. In addition, the image and audio quality is outstanding, resulting in life-size images of people with all of their body language, including verbal and nonverbal communication such as eye contact.

Cisco TelePresence addresses the human factors that are required in a virtual classroom such as communication and collaboration from geographically dispersed locations, where the visual experience is critical to the learning experience. By addressing critical human factors, Cisco TelePresence can enhance the teaching and learning experience by situating the students and educators in a collaborative context, enabling interactions between the educator and the students and between students.

Within a virtual classroom environment, Cisco TelePresence can:

- Increase access to students
- Broaden the learning experience
- Enable distributed, virtual classes
- Increase access to experts
- Maximize social contact
- Enhance group coherence
- Provide a means to get both students and educators to a central virtual location
- Eliminate expensive travel
- Make the best use of limited time
- Allow genuine dialogue between all participants
- Provide immediate, full, two-way communication and sharing of content such as documents
- Create a sense of social interaction and collaboration

Cisco TelePresence can thus help to:

- Convey the messages using nonverbal communication (e.g., gestures, tone of the voice, posture, eye contact)
- Provide visual feedback in real time
- Enable the process of collaboratively editing a document
- Support informal contacts between educators and students as well as among students
- Increase the capability to establish a sense of shared space among geographically separated members of a group

As a result, Cisco TelePresence could increase student motivation and improve the effectiveness of a virtual classroom environment. Some of the applications that are possible with the Cisco TelePresence solution include:

- Enabling virtual administrative communications
- Providing flexibility for students and educators by improving access to learning and teaching resources
- Enabling remote access to advancement placement (AP) classes for high school students
- Delivering distance learning courses by bringing educators and students together from various locations
- Providing training and continuing education for professionals
- Enabling shared learning resources, experiments, and demonstrations
- Enabling virtual observations and e-mentoring
- Providing opportunities for educators and researchers to communicate and interact regardless of location
- Increasing access to students and broadening the learning experience by enabling distributed, virtual classes with improved access to experts

And for higher education, in particular:

- Collaborative research—enabling researchers to have frequent contact during research cycles, which often involve multiple, globally dispersed teams
- Dissertation defense—eliminating costs associated with flying in panel experts for defense during PhD completion

Examples:

- Close the gap in distance education—The use of Cisco TelePresence and its interactive qualities can make students around the world feel like they are sitting in one classroom. A Cisco TelePresence environment allows teachers to engage their students and hold their interest by interacting directly with scholars, no matter what their age. Asynchronous methods of teaching, such as videos or telecasts, can quickly become boring and nonproductive. With Cisco TelePresence, students can interact with other class members, ask questions, and receive feedback easily and immediately.
- Continue education outside the classroom—NOAA and NASA both use TelePresence to allow unique interactions with inaccessible environments such as the deep ocean and the international space station. Students can experience environments never before possible in a new and exciting way that will leave an impression for the rest of their lives. Participants can even control telerobotic instruments, cameras, talk with explorers, and perform experiments remotely in some instances. Imagine learning about space by manipulating a rover on another planet—plans for this type of activity are already on the drawing board at NASA.
- Allow students who are unable to attend class to keep learning in a comfortable environment—Telepresence devices such as PEBBLES allow students receiving hospital treatment or home care to participate in normal classroom activities. PEBBLES is a small robot with a display for a head, wheels for mobility, and even a flexible arm that can be raised or lowered. Using PEBBLES, children can move around and interact with students and teachers as if they were right in the classroom. For more information about PEBBLES and other educational applications, see the March/April 2007 issue of *telepresence world*.

The Future: Emergence of Unforeseen Uses

New technologies often surprise us by how their uses do not necessarily match the preconceived notions of what might be, as societies find novel ways to exploit them. In effect, each technology creates a new niche for itself.

For instance, with e-mail and instant messaging:

Original Perception	Unforeseen Uses
E-mail: “Like an electronic letter”	“A medium of its own”
Long e-mails	Shorter, to the point
Slow turnaround time (days, even weeks)	Faster turnaround (hours)
Linear answers	Interspersed answers
Instant Messaging: “Like an instantaneous e-mail”	“A medium of its own”
Long IMs	Short IMs
Slow turnaround time (hours)	Fast turnaround time (seconds or minutes)
Linear answers	Bursty answers
Single-threaded	Multithreaded
Single-party	Multiparty
No backchanneling to audio	Backchannel to conference calls

It is quite likely that many applications of Cisco TelePresence have not been discovered yet, and that the most profound implications and transformations will occur when costs (of bandwidth, mainly) bring it to the consumer in their home.

Summary

New trends in education encompass nontraditional emphasis; lifelong learning; the integration of study and employment; student-centered, self-directed, active learning; the ubiquitous use of technology in learning; and the personalization of learning. All these will benefit from harnessing technology to bring students and educators into closer contact than exists in most traditional, non-technology-based teaching. Using the power of IP technology to implement a Cisco TelePresence solution, educational institutions will enable improved collaboration in the academic community by bringing people together that are geographically dispersed into a single conference to facilitate discussions, share ideas, and make decisions.

Appendix—Technical Features

- Standards interoperation enables use with existing video conference systems
- Available in one-, two-, six-, and eighteen-seat versions
- Multipoint support for 48 single-screen CTS1000 endpoints, 16 three-screen CTS3000 endpoints, or a mix of both in a single meeting
- Projector image is repeated to all sites, so anything shown on the screen in one site will be shown on the screens in the other sites
- Document camera option enables collaboration involving physical objects
- Compatible with other Cisco technologies such as WebEx conferencing and Digital Management System for enhanced collaboration via live and on-demand mechanisms



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