# Videoconferencing for Primary and Secondary Schools — Where Are We?

WHITE PAPER BY

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To most educators Interactive Videoconferencing (IVC) in the classroom still qualifies as a cutting-edge innovation. However, to a growing group of teachers, administrators and technologists, IVC is rapidly becoming a tool as pervasive and accessible as the Internet itself. This whitepaper will highlight numerous advantages that IVC provides for teachers in Primary and Secondary education, identify resources for teachers interested in learning what it is all about, and assess the current potential of videoconferencing for implementation on a wider scale by Primary and Secondary teachers.

## Benefits of IVC in Primary and Secondary Curriculum

A teacher new to the concept of IVC might well bring a critical eye to this technology. After all, current Primary and Secondary trends toward "teaching to the test" (accountability assessment through standardized testing) call for a thorough validation of IVC's efficiency as a teaching tool. What is immediately clear is that as a supplementary tool for teachers, IVC technology bears substantial potential for fostering a richer, more comprehensive Primary and Secondary curriculum, bringing to any classroom extraordinarily rich resources simply not available otherwise.

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IVC offers assistance to classroom teachers who may lack the knowledge or experience needed to teach a particular subject. Teachers are human beings, and no matter how well they are trained to do their jobs, it is a rare teacher who feels totally comfortable delivering instruction in every content area. Some teachers are stronger in literacy instruction, some in mathematics, and some find their comfort zone teaching science. Especially in elementary grades where teachers in self-contained classrooms are often expected to be experts in every field of knowledge, IVC can bring supplemental expert resources into a classroom at little or no cost, once the equipment is purchased and properly configured. These resources can help broaden the scope of instruction in any subject area.

IVC also brings a welcome change of pace to the prevailing instructional style in any classroom. A 20 minute IVC presentation by an expert in any field can provide, in a novel and motivating way, richer content than can be presented in the same amount of time by the in-class instructor through traditional lectures. Students respond positively when given the chance to discuss, for example, how stars are born or what space travel is like with a premier research astronomer who is both cognizant of the students' level of development and interested in reaching them on that level.

## IVC in Practice

For three years, I served as facilitator for the "VIA Dyer" (Videoconferencing Interactions with Astronomers at Dyer) series that provided students across the nation with weekly videoconference presentations from scholars at Vanderbilt Dyer Observatory. During this series I witnessed several repeat presentations on the same topic, in particular, an excellent presentation by Bob O'Dell, "Astronomical Observatories"—a fascinating overview of extra-Earth telescopes, including a discussion of why they are needed. In the ensuing question

and answer sessions, I sometimes heard O'Dell receive the same or similar questions in subsequent sessions. While his answers would often be formed by his earlier ones, every time I heard him construct a new response, it was in some way different—and often more substantive, more interesting, and more age-appropriate—than the answers he had given before. Not only was he getting better at IVC, but he was also so obviously passionate and knowledgeable about his topic that he inspired genuine engagement with his audience. It was not a canned presentation; it was conversation.

In the course of his presentation, O'Dell often narrated a three minute computer-generated virtual fly-through of the Orion Nebula. While students could use Google to find and download this digital video from the Internet, with IVC they could see it and simultaneously hear narration by the very person who directed the 500-manhour team that actually constructed the animation. O'Dell's team constructed the animation out of mathematical models and images sent back to Earth by the Hubble Space Telescope, and O'Dell himself was project scientist for the first team that undertook the design of the Hubble telescope. IVC affords students a unique opportunity to interact with someone immediately involved in current research in a given discipline.

One other phenomenon that helps teachers see the potential for using interactive videoconferencing is its proponents' practice of documenting interactions on the Internet for parents and for other teachers. IVC is such a visual process that simply describing it with words does not do it justice. Video examples can help fill that gap. My own school, the University School of Nashville, dedicates a Web site page to videoconferencing, and readers can visit it anytime to see brief video clips and "Web celebrations" of some of our past events. Other schools similarly document their videoconferencing projects on their own Web sites. Some examples are:

- Bryant Elementary (CA) School's Ghostwriter project;
- Schenectady (NY) City School District's "All Projects" pages;
- University High School (CA) and Indiana School for the Deaf's SOAR-High Videoconference; and
- Berrien County (MI) School District's SouthwestNet Distance Learning Collaborative.

At the University School of Nashville's celebration page, noted above, one project in particular demonstrates how incredibly powerful IVC can be when implemented thoughtfully and carefully. The TheatreLink Project (now in its fourth year) brings together drama classes in high schools all over the country. Each class works with a playwright from the project's sponsor, the Manhattan Theatre Club. Students collaborate via IVC, e-mail, online chat and electronic bulletin boards while creating a short play. The students then pass their play to another participating school and, in turn, receive the play written by those students. Each school then works, using the same tools, with a professional director to fine tune a production of the play they have received. In the final activity, schools present the play they have produced over IVC for the students who wrote it. Clearly, for this project and for so many others, interactive videoconferencing enables a level of collaboration and coaching that would be impossible to achieve without it. IVC student collaboration of this nature assures the implementation of constructivist pedagogy and engagement at a higher level of thinking.

## IVC Resources and Opportunities for Collaboration

While Primary and Secondary videoconferencing may occupy a low priority level among national policymakers, it has no shortage of regional supporters who are attempting to speed along its adoption. "Clearinghouse" organizations have established Web sites around the country in an effort to make finding relevant resources less time-consuming. These groups also strive to position themselves as centralized locations for content providers (museums, art centers, science centers, etc.) to advertise their programs and schedules.

One of the most developed of these is the Center for Interactive Learning and Collaboration (CILC). Rising out of telephone company decentralization during the late '90s as a grants-based effort to coordinate statewide Primary and Secondary IVC collaboration, this Indiana organization was one of the first to offer educators options to seek out "informal educator" programs by provider or theme and to customize the search by grade level, subject area, cost or any combination thereof. Teachers may also post calls for collaborative classroom-to-classroom projects or search through archives of those already posted. Currently scheduled programs may be selected and registration for them completed, all at CILC's Web site. Presently, CILC services are free, but many of the providers charge nominal fees. School administrators who have reservations about the nominal fees need only compare the cost of a "real" field trip to a zoo or museum (assuming one is locally available) with the cost of the IVC programs—as well as consider the amount of instructional time lost in a "real" field trip compared to a virtual one—to realize the substantial educational benefits such programs can offer relative to the cost.

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Other online-accessible services do a commensurately good job of sharing opportunities. These include Knowledge Network Explorer (KNE) in California, Digital Bridges in Oregon and the Northwest, and Global Leap in the United Kingdom. KNE provides perhaps the foremost listserv dedicated to interactive videoconferencing: ed1vidconf, an automatic e-mail newsletter system utilized by content providers and individual teachers to promote and to learn about new IVC programs. Digital Bridges has evolved into a valuable resource site for both "Web-based learning" and videoconferencing. Its examples and collaboration resources are ones all new implementers could add to their arsenal of tools. Global Leap connects U.K. students with one another and with content providers both nationally and internationally. Increasing content availability is another factor driving adoption; a quick trip to any of the above Web sites yields substantial offerings in almost any category or theme.

Colleges and universities are also exploring ways to offer outreach to Primary and Secondary schools, through efforts such as those by the Vanderbilt Center for Science Outreach (CSO). The Center strives to be its own kind of clearinghouse by helping to manage, through in-classroom as well as videoconferencing programs, some of the outreach requirements that are becoming commonplace in any newly awarded scientific research grant. The CSO delivers dozens of free IVC programs to schools nationwide every school year. Vanderbilt Primary and Secondary outreach is not limited to science alone: the Vanderbilt Virtual School offers an ever-changing gamut of IVCs in the humanities at its own Web site.

## IVC Research

The International Society for Technology in Education (ISTE) recently released a book that offers, along with a brief history of technological developments in the videoconferencing field, a view of how educators are using technology. Educators utilize audiovisual codec technology (the integrated circuit or chips that convert analog audio/video data to digital and reassemble it all at the receiving end) to bring experts from all fields of learning into their classrooms and to take their students into distant places—all without travel from place to place and all without the scheduling, expense and security issues that travel involves.

In Videoconferencing for K-12 Classrooms: a Program Development Guide (2004), Camille Cole, Kecia Ray, and Jan Zanetis describe the increasing prevalence of this tool as a means of connecting students in an efficient and economical manner with the "real world" outside classroom walls. The book's appendices offer a wealth of resources and checklists for making IVC experiences successful. One indication of the book's success (and yet another indicator of the ongoing adoption of IVC in Primary and Secondary school setting) is a timely interview with Zanetis in Education World (Jackson 2005). A growing body of research indicates that IVC instruction, when delivered well, is at least as good as in-person classroom instruction. The title of Thomas L. Russell's annotated bibliography, *The No Significant Difference Phenomenon* (2001), might appear to be bad news for adopters, but its findings, extractions from 355 different research analyses focused on distance learning outcomes compared to traditional classroom ones, actually underscore what common sense might lead us to expect: the way a topic is taught is much more important than the vehicle used to deliver the teaching. It can be argued that since this is the case, one might as well utilize technology to deliver content, as long as the material is delivered in a thoughtful, carefully conceived and well executed manner.

Russell's controversial study (used by proponents on both sides of the traditional versus technological debate) is cited in an article called "Navigating the Sea of Research on Video Conferencing-Based Distance Education: A Platform for Understanding Research into the Technology's Effectiveness and Value" (2004). Wainhouse Research, the agency responsible for Alan Greenberg's incisive paper, offers an extremely rich well of research resources at their newly-mounted Web site, WRP Platinum (registration required) in the form of complete whitepapers such as "Merging Live Conferencing with Collaborative Group Workspaces" (2005) and "The Business Case for Videoconferencing: Understanding the Benefits, Costs, and Risks of Videoconferencing Over ISDN and IP" (2002). These resources provide the sort of detailed analysis and documentation that can help an institution's IVC advocate convince administration and faculty that interactive videoconferencing is not just a trendy new technology.

## Technological Advances and Cost Factors

An additional factor driving the growth in Primary and Secondary IVC is the relatively recent emergence of increasingly reliable IP network connectivity. Hstorically, the cost of maintaining dedicated telephone lines for ISDN videoconferencing connections has been a major obstacle for the adoption in schools. Line fees can range into the hundreds of dollars per month for a resource that may be used only once or twice a month; school administrators have had a hard time justifying that expense, especially considering that many connections also

involve long-distance charges. Now that IP connectivity is more readily available and codecs are offering higher rates of compression (thus more available bandwidth), more content providers are offering IP-delivered programs. As a result, more schools can consider equipment purchases. Another recent development is the "Expressway" solution from TANDBERG, which eliminates the headaches of connection issues due to security safeguards via its "firewall traversal" software, creating a secure path for video to pass through firewalls.

Getting started with IVC may require a school to invest in a videoconference unit or codec. In many cases, existing television monitors or projector screens can be combined with the codec for display of video. While a growing variety of desktop "eyeball cam" solutions can provide increasingly consistent connections for one-to-one planning sessions or casual conversations (see my Desktop IVC Sharesite for more detailed discussions of those possibilities) the quality is not sufficient for communicating with a large group of students. In a classroom setting, room-sized systems, such as those offered by TANDBERG provide the necessary quality in order for learning to occur. Additionally, most content providers will only connect to these room-sized units.

## Further Steps Towards Integrating IVC Technology in Primary and Secondary Education

In the fall of 2004, the first national conference dedicated to IVC in Primary and Secondary classrooms was held. The Keystone Conference, centered in Indianapolis, Indiana, was attended "virtually" by an estimated "1,400 people from five countries and 35 U.S. states" via IVC, with 160 attendees present locally (2005, 1). Conference presenters, many of whom were content providers, offered informative sessions both from Indianapolis and from their remote locations. Each presenter who was also a content provider was required to create a brief "Public Service Announcement" for airing in between conference presentations (for example, see Vanderbilt's four minute presentation in Exhibit 1). A second such conference, also "located" in Indianapolis, was held on October 3-5, 2005. One of the most valuable benefits of IVC is its potential to be recorded and archived: See the Keystone archives http://vbrick.net/keystone/ for viewable video archives of all the sessions from that excellent conference.

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Another powerful sign of IVC's growing prominence has been its significant presence at the International Society for Technology in Education's (ISTE) annual National Educational Computing Conference (NECC), held in the summer of 2004 in New Orleans, Louisiana. Of the over 170 workshops being held for the estimated 15,000 educators and technologists who attended, 39 of them featured live demonstrations of ways to use videoconferencing for educational enhancement. Additionally, 18 "Interactive Videoconferencing Showcases" were offered, and a commensurate number of the 265 "concurrent sessions" either featured the use of IVC or relied, in some measure, upon the technology. Videoconferencing content providers and vendors were also highly visible on the convention exhibit floor, where vendors from all over the country vied for prominence in the hearts and minds of administrators and technology coordinators—the people who make decisions about what to purchase in order to implement interactive videoconferencing in their schools or districts.

At an NECC "birds of a feather" session for Primary and Secondary videoconferencing proponents, one advocate suggested that we need a national focus on its adoption, primarily in the service of leveling the educational "playing field" between urban and rural school systems. Administrative focus on Internet connectivity achieved nearly universal Primary and Secondary access to the Internet. Why could we not achieve the same access to videoconferencing for all students in our nation?

Another NECC IVC proponent mentioned the need for increased bandwidth availability, possibly through Internet2 or via some other dedicated pipeline, as well as the need to make IP connectivity through the maze of security systems more "user friendly." Still another suggested that a new organization dedicated to Primary and Secondary videoconferencing be established along the lines of the United States Distance Learning Association (USDLA), which itself mainly focuses on higher education implementations and has a broad scope, entailing all kinds of distance learning delivery. All of these measures would help, and it may be that just one of them would be what NECC 2004 keynote speaker Malcom Gladwell calls the "tipping point," the event that makes the crucial difference in popular and irrevocable adoption.

At the NECC 2005 conference in Philadelphia, over 18,000 attendees gathered to discuss all manners of technology innovations, and once again IVC was a prominently featured technology. Most tellingly, the growing impact of IVC in the field of education was so deeply felt that a new members' special interest group (SIG) was formed: The SIG-IVC, led by the aforementioned IVC expert Jan Zanetis along with Camille Cole and Ruth Blankenbaker, currently consists of 100 ISTE members and is projected to grow exponentially now that it has achieved official SIG status. ISTE members—over 85,000 educators, technologists, and administrators—are encouraged to join at least one SIG of the nine currently available. At NECC 2006, to be held over the July 4 week in San Diego, California, thousands of attendees will attend dozens of workshops and showcase sessions designed to introduce them to IVC's potential.

## Conclusion

Whatever steps are next, it is clear that the first ones have been set squarely in place. I believe in the value of IVC to support real learning in myriad and valuable ways. Strides continue to be made, implementers continue to adopt and utilize IVC to accomplish their own educational objectives, and hardware and software technologies continually improve. Meanwhile, the good news for all of our students is this: interactive videoconferencing is here to stay.

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