

Access^{and} Opportunity

Policy Options for
Interactive Video
in K–12 Education

August 2003

Advice from a national symposium
of practitioners in October 2002

Organized by:

Northeast & Islands Regional 
Technology in Education Consortium

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South Central Regional 
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August 2003

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Executive Summary

The new generation of distance education technology, interactive videoconferencing (IVC), offers support for the most promising strategies for active learning. Unlike the one-way nature of satellite course delivery that made interaction more difficult and time-consuming, the two-way communication of IVC offers the opportunity for teachers, students, and remote experts to engage in a more natural and lively give-and-take that captures the goals of current school reform efforts. While the technology does not guarantee it, the interactivity makes it easier for teachers, rather than appearing as “talking heads,” to take on the role of instructional guides, allowing students to forge their own path toward understanding.

Some of the nation’s leading IVC experts and practitioners in the K–12 use of IVC, meeting at an invitational symposium in October 2002, proposed a number of bases for policies that would greatly enhance the technology’s huge potential for engaging students and enriching instruction. Symposium participants—who represented school districts, regional service centers, and state education agencies from around the United States—identified several key needs in the field:

- Ready access to shared experience through a clearinghouse
- Internet and video links between users and resources
- Research
- Federal support for information dissemination and staff development
- Widespread access to broadband (high-speed) lines

What IVC ultimately offers, the participants agreed, is access and opportunity. If educators choose to use the full capabilities, the technology can offer students face-to-face access to people, places,

and real-time explorations all over the world. Teachers can gain access to professional development resources. School and district staff can gain new avenues for increased interaction. And it provides opportunities for both coursework and supplemental activities that would otherwise be unavailable in students' local communities. What's needed, the participants concurred, is the support of administrators, funding agencies, lawmakers, and policymakers to refine and expand this exciting avenue to richer, broader, deeper learning for all learners—students and teachers.

Introduction

Most of the 10 Regional Technology in Education Consortia (RTECs) have noted an increased interest in and use of Interactive Videoconferencing (IVC) technology in schools. This national interest—and the particularly high level of activity and interest in the Northwest region—led the Northwest Educational Technology Consortium to form a collaborative with the RTECs for the Southwest and Northeast regions to investigate the lessons learned so far. As part of this investigation, the three consortia conducted a symposium for experienced users of videoconferencing in K–12 education with the goal of documenting experience and producing useful policy advice.

Convened in Dallas, Texas, in October 2002, the symposium drew 95 participants from 26 states, including RTEC staff (see Appendix A). Among the attendees were teachers, administrators, and others from school districts, as well as representatives of regional centers, state education agencies (SEAs), and commercial and nonprofit organizations. At least 15 of the states represented have statewide IVC systems providing high bandwidth networks and/or staff development and other services to school districts.

The major issue areas addressed by five invited speakers included partnerships for content development, changing the teaching and learning paradigm, effective use of the IVC medium, implications of Internet2 development for K–12 interests, federal roles, and research needs (see Appendix B). Panels composed of selected attendees presented information and highlighted issues in three areas: promising instructional applications of K–12 IVC; promising district-level applications of IVC; and IVC policy perspectives from state administrators (see Appendix B). Small groups discussed the issues further, and birds-of-a-feather groups were

formed around topics of particularly high interest, adding to the elaboration of issues. Their discussions were recorded and used in the identification and development of themes and policy issues for this paper.

In preparation for the symposium, RTEC staff prepared case studies drawn from current practice, a review of research, and a policy review to serve as background materials for discussion groups (see Appendix C). That policy review presented a comprehensive outline and analysis of the areas that should inform school boards and other policymakers in their own policy development. This policy paper focuses instead only on those issue areas that received the greatest attention and comment in the symposium—those that are the most important to the current practitioners of IVC in K–12 settings. Together, the two documents provide not only a broad outline of policy areas but also an in-depth consideration of the areas of greatest concern to those who are heavily involved in the field. Some examples of actual state policy from the earlier review have been repeated in this report for illustration purposes.

Overview: Lessons From Practitioners

The educators and representatives of their supporting agencies who attended this symposium provided a comprehensive picture of the current state of practice in interactive videoconferencing in K–12 education. Their deliberations also identified many lessons and understandings from their common experiences which led to strategies that meet needs and expectations for the technology. These understandings are summarized here to provide a concise conceptual basis for thinking about sound policies necessary for such successful implementation. From the experience of symposium participants, it is clear that:

- **Interactive Videoconferencing (IVC) is neither new nor experimental** as a technology or as a tool for educators; it works in a variety of settings for students, teachers, and administrators. The value of IVC has been demonstrated in rural and urban settings, and in administrative as well as instructional processes in school districts, regional service agencies, and state education agencies (SEAs).
- **Practitioners have demonstrated improved delivery** of courses based on the increased level of interaction between teachers and students offered by IVC technology. Compared with one-way video systems, IVC provides more opportunities for enhancing instructional strategies based on student involvement, responsibility, research, and problem solving, and for changing the “talking head” instructional model. However, the technology alone does not ensure change in instruction.
- **Interactive access** to people, places, and other worldwide resources as an enhancement to classroom instruction has greatly enlarged the definition of distance learning, as demonstrated

over several years by many projects. The image of distance education as only a means of course delivery to remote students, perhaps resulting from correspondence courses and broadcast television technology, is demonstrably out of date in the world of broadband transmission and interactive technologies.

- **The IVC technology itself does not teach**, but properly implemented, is an effective avenue of delivering instruction and accessing learning. It is a tool for improving opportunities for learning, but there is no reason to expect test scores to rise as a result of using IVC any more than for any other tool. IVC needs to be valued for its capacity to provide access for teachers and learners to more information and learning opportunities, and access for teachers and administrators to greater collegial communication.
- **A program of staff development should be integral to every implementation of IVC in a school or district.** It should address not only the operation of the technology but also the instructional strategies necessary for effective use of IVC, and the new staff roles necessary for a multi-site environment. The program should also include opportunities for administrators, support staff, and other teachers who are not direct users of IVC.
- **There is a large body of experience in using IVC in K–12 settings.** Models of successful implementation exist for schools, school districts, regional service agencies, and states. Those models vary because of different organizational structures and levels of support and collaboration between and among the different entities. Within these models, there are adequate definitions of potential roles for each entity so that any agency could enter this field using the experience gained by others. However, there is no adequate mechanism for planners and potential users to access the accumulated experience.

- **Thoughtful policy development and fulfillment of specific roles** by individual schools, districts, regional collaboratives, and states has been shown to be important if widespread success is to be achieved and the benefits made available in all states and locales.
- **There is a need for national and international coordinated systems to link users and resources** through the identification of producers, content, and potential partnerships for interaction. This is especially important in the IVC environment because of the potential for capitalizing on opportunities to participate in rare or one-time national and international events through live interaction. Some statewide IVC systems are already demonstrating the value of coordination of access to opportunities for content and support within state boundaries.
- **Federal government support for IVC so far has been indirect and limited** to possible benefits from telecommunications assistance to districts through the E-rate program for schools and libraries administered by the Federal Communications Commission (FCC). Potential federal supporting roles in staff development, information clearinghouses, and national sharing of effective practices have been successfully demonstrated in programs of the U.S. Department of Education, such as Star Schools. Similar support would greatly assist in expanding the use of IVC.
- **There is a lack of research on IVC in K–12 settings.** Such information is crucial to the continued improvement of the use of IVC and related technologies in instruction and in the operation of successful schools and districts.

Summary: Common Policy Issues

The previous section provided an overview of the beliefs of most participants based on their collective experience during the past decade. However, the comments of speakers, panels, and discussion groups covered a wide spectrum of topics of concern to practitioners. An analysis of the presentations and discussion notes reveals a core set of issue areas defined by a high volume of comment. They are the issues of greatest concern to those involved in the field, and as such should be areas of prime concern on which planners and decisionmakers focus their thinking as they consider implementing IVC in schools. They are summarized here, and then explored in greater detail in the “Policy Issues” section of this paper.

- **The goals for using IVC in K–12 settings** relate to the major reasons to incorporate IVC as a tool: to increase the opportunity for learning through professional development, student instruction, and collegial interaction. Bringing in courses from remote points of delivery is one way to increase learning opportunities. Another is to enlarge student and teacher access to information and expertise. The audience for these goals is teachers, administrators, and all students in most grade levels.
- **The content issue consumed more discussion time than any other issue**, encompassing the factors of development, curricular match, standards correlation, quality, and cost, as well as the challenge of resolving the interests of commercial producers, nonprofit producers, and consumers. Symposium participants were interested as much in opportunities to enhance classroom instruction with supplemental content as they were in production and delivery of full courses.

- **Professional development concerns focused particularly on the preparation of the teachers** who are to be directly responsible for instructional IVC. Training both in equipment use and the structure and methods of effective instruction were key issues. Also of concern were the roles of personnel to support effective use, including technical and instructional support staff, curriculum staff, and administrators.
- **Assessment is an issue made even more critical** by the national emphasis on regular testing of student progress. A major concern in this area is resolving questions about the implications of NCLB legislation for testing, and the connection between technology-based learning experiences and standardized testing. There is a need for tools to measure the effect of interactive video on learning, especially in the non-course applications that many participants see as valuable.
- **More research was called for** because little has been conducted specifically in the K–12 environment. Extant research results are based mostly on postsecondary course delivery uses. There are many questions about its applicability to children, and non-course applications have not been addressed. The need for research caused a group of participants to meet during and after the symposium to consider a national research agenda.
- **Facility and network planning**, with particular concern for locating equipment as close to the users as possible, is a key factor in successful videoconferencing. Transporting students to a different building for video access can generate problems similar to the logistics of a field trip. Variances in time zones and school schedules are two problems in the coordination of students at distant sites, both of which result in policy requirements regarding funding and opportunity. Access to high bandwidth is a key to achieving the full benefits of both interaction and video, but many schools don't yet have access

to sufficient telecommunications bandwidth to carry IVC satisfactorily.

- **Funding is a continuing concern** for IVC, as it is for any technology. Practitioners say that the increased opportunity for students is worth the cost, but symposium participants provided few solutions to funding problems. Barter systems in which two or more entities each develop and share content with the others, or where professional development opportunities are bartered for student instruction, are being tried in a number of locations. Participants advocated an expansion of E-rate coverage to include equipment necessary for classroom usage.

Policy Issues

The previous section provided a summary of the policy issues emphasized in the deliberations of the participants in the symposium. In this section, following the same order, consideration of each of the issues is expanded by recounting in greater depth the details from presentations and discussion group notes.

Policy Issue: Goals and Audiences

What goals should we have for using IVC?

The major goals among symposium participants for using videoconferencing technology are the improvement of instructional opportunity for students, staff development opportunities for teachers, and collegial interaction among teachers and administrators.

Improving instructional opportunity for students has several interpretations. Bringing courses or subject matter to students when teacher expertise isn't available is prominent in current usage. Enriching the study of topics when little material is on hand in the school, access to outside experts, and enlarging the student's view of the world through interaction with students from other cultures and settings represent a growing body of applications.

Participants agreed that educators and decisionmakers who are addressing the new federal emphasis on frequent standardized testing tend to ask what effect the technology will have on student test results. While attendees felt that IVC is valuable to improved teaching and learning, connecting use of any technology to change

in subject area test scores is problematic. Most felt that the question should focus instead on good instructional design, whether delivered by technology or other means.

As one discussion group put it, “A test score will not rise in a single student because of IVC.” Panel member Randy Hall from Carnegie Hall School in New York City noted that instead of asking whether IVC is “as good as” some other delivery method, the question is whether the student would have had access to the content without IVC. “The major issue is access and student scores jumping up individually because of access!”

“It is not a matter of student scores jumping up individually, but access!”

one discussion group stressed. Another group remarked: “The research is there for (effective)

teaching. Teaching is teaching, and IVC is IVC. How is it any different from teaching face-to-face? It only broadens our options.”

One group observed that many IVC opportunities are helping to change the paradigm for the way learners seek information—away from the emphasis on lecture and rote learning toward more project-based learning and new roles for teachers and learners. The opening keynote speaker, Dr. Stan Silverman, posed the “four E’s” as a framework for such instruction: Enticing, Encouraging, Enabling, and Empowering. (See <http://neirtec.terc.edu/k12vc/symposium/speakers.cfm> to view the Silverman video clips.)

In another discussion group, systemic change was addressed by a regional provider. “With 125 endpoints (i.e., IVC sites),” the provider said, “the major issue is access and who can and cannot participate. There has been systemic change in districts with IVC because of access.”

From a teaching standpoint, the challenge of bringing up-to-date information to the classroom is too great to address without the use of new technologies such as IVC. One teacher put it: “I can’t get my job done anymore without these tools. We need to know which tools fit the situation best.”

Who can benefit from IVC?

For whom is instruction by interactive videoconferencing appropriate? The resounding answer from participants is “almost anyone.” Distance education systems have traditionally emphasized the delivery of courses for credit, with a particular relevance to high schools. However, symposium participants were interested as much in enrichment content to enhance classroom instruction as they were in full-course production for credit, emphasizing the importance of such learning opportunities for a wide range of elementary and secondary instructional settings.

In his address, Silverman gave a description of his work in using IVC to connect students to museums, zoos, and other institutions having great information resources and staff expertise, to expand students’ conceptual and physical boundaries. While the practitioners said that course delivery is and will be a major element of distance delivery through IVC technology, they also paid a great deal of attention in both panel discussions and group discussions to instructional opportunities incorporating live interactive experiences that could be used as an enhancement to classroom instruction. In addition to Silverman’s examples, these offerings include students collaborating with others in other physical locations, and student interaction with experts on their work site such as astronauts in orbit or archaeologists on an excavation site.

Such opportunities are otherwise unavailable to students, and they deliver curricular content with far greater currency than that contained in many printed materials, such as textbooks. They are

already a large part of current IVC usage at elementary and secondary levels, and are useful to schools in cities as well as remote rural locations. One group observed that smaller districts are getting involved in IVC much faster than larger ones because they are often the ones with the most to gain.

The implications of these ideas are many. Examples presented at the symposium show that the emphasis in higher education institutions on IVC for course delivery is only a part of the picture in K–12 settings. While high schools might tend to be like higher education in the focus on course delivery, there is strong interest in and usage of supplemental applications in elementary and middle schools. This makes access to IVC opportunities and the development of technical infrastructure for those schools and ages as important as for high schools.

In addition to expansion of technical access, the view of the applicability of IVC in the minds of educators and support personnel must be expanded. In one discussion group, a principal discussed the ongoing battle with district technology staff concerning what videoconferences teachers and classrooms may have access to. The responsibility for instructional design decisions should be with instructional staff rather than technical staff. Special student populations can be reached with IVC, although some bring special problems because of policies related to the population. In the case of incarcerated juveniles, for example, the remote site is not allowed to broadcast student images from detention facilities. This means that a teacher can deliver content but cannot see the students at the detention center, reducing the quality of interaction. In one participant's state, juvenile detention facilities broadcast between the detention centers, initiating instruction from within the system so that identity is not an issue.

Policies based on outdated assumptions can limit opportunity and potential audiences. For example, state policies for alternative delivery systems identified in the pre-symposium policy review

dealt with courses and credit, and are silent about non-course opportunities.

Policy Issue: Content

The term “content” is used here to describe a collection of knowledge, experiences, or learning processes that fulfill educational objectives. It includes traditional courses, such as typical secondary foreign language or math courses; instructional units of short duration offered at elementary and higher grade levels; and many types of interactive experiences for students.

Access, or lack of it, was cited by many as a major problem area; in particular, access to content was a major point of discussion. One participant noted: “Access is a critical issue—to what degree can we forge policies to bring more videoconferencing?” Elements of this complex issue area include content availability, development, curricular alignment, standards correlation, quality and cost, and resolving the interests of commercial producers, nonprofit producers, and consumers.

Educators interested in using IVC usually have a number of questions about content: What is available? Who develops it? How do you find out about it? Are there quality standards? Is there enough content for me to set up a curriculum for a homebound student?

First, it is clear that few people have comprehensive knowledge about the availability of IVC opportunities. A number of the SEAs and regional service centers represented at the symposium have well-maintained Web sites with links to many sources, but no single site is nationally comprehensive and frequently and regularly updated. Second, a great deal of content is generated locally by schools or districts, and the mechanisms for advertising availability are limited. Some districts try to form sharing arrangements with others

using a barter system in which each participating district agrees to provide its share of content in return for the use of contributions from the others. This reciprocity requirement in some cases limits the availability to other potential users who are unable—for lack of expertise or other reasons—to act as developer and producer.

Third, the areas of the nation where content is produced and made available widely appear to be those where regional or statewide organizations are formed and funded to support and encourage IVC usage through services and coordination. These include Indiana, Wisconsin, and Texas, among others. Sometimes, as is the case in Texas, these are based on the regional service centers. In other places such as Indiana, a private, nonprofit agency provides assistance. There is no single, generally available, nationwide database of courses and other opportunities delivered by IVC. (See the “Major Recommendation” section later in this paper.)

One discussion group suggested the need for models of organization for the dissemination of content. A searchable database linked to standards—one that includes regular maintenance, guidelines (or a rubric) for quality of content, and links to state systems—needs to be funded and developed. They also recommended development of an accreditation tool or rubric for content providers.

Seldom do districts complete a thorough examination of content to answer such questions as, Which parts need interactivity or would benefit from it? How much of the content that is currently delivered via “talking head” could be better presented by some other method? Some content, for example, may need to be only 50 percent interactive, with the rest delivered by videotape or other method without wasting interactive time. An integrated system of IVC, Internet access, e-mail, chat rooms, and other constructs can define a very rich instructional system; the technologies complement each other.

Aligning curriculum and meeting state standards are major concerns in many situations, especially when using a technology in which content can be originated anywhere and many video opportunities—both full courses and supplementary activities and materials—come from other states. SEAs and the federal education department require instructional materials to meet certain standards in order to receive grant money, and some SEAs require alignment for a school to use the content.

In his keynote, Silverman described an organization he has formed consisting of museums, libraries, and other nonprofit organizations having resources in information and people that are important to schools. He and his staff provide advice and assistance in improving the quality of their content and approach for K–12 schools. His project pays teachers to align available offerings to standards and put that information into a searchable database. He indicates that if you don't have standards alignment with content, even to the key components and performance indicators, it won't be used.

What does it mean to say a unit or course is aligned, and what evidence will verify that it is aligned? An SEA representative said:

“When we fund teachers to do this, they are given a charge to look at stated learning outcomes that a videoconferencing provider says their material accomplished and then align that to state curriculum standards. But there is a leap of faith that what the provider says is the outcome is actually the outcome.” Apparently, there is no mechanism other than communication with previous users to determine the validity of such claims.

“But there is a leap of faith that what the provider says is the outcome is actually the outcome.”

In addition to concerns about curriculum alignment, many participants were particularly concerned about the terms of the federal No

Child Left Behind legislation and attendant regulations. They have major questions about the relationship between instructional technology and student progress as measured by tests—a relationship that has not been determined. The participants agreed that ubiquitous access to modern tools of communication in all schools is critical to the leveling of student opportunity, regardless of the link between technology use and test scores. Especially in small rural schools, children without access to content through telecommunications will certainly be left behind their peers in larger schools and schools having broadband service and access to technology.

There was considerable discussion of the NCLB emphasis on testing. The focus on standards has caused participants to question how to deal with the various content options in videoconferencing. How do we balance NCLB with Silverman’s fourth E, empowerment? What does the current testing environment mean for the collaboration element of IVC content? How does it relate to test scores? The implications of NCLB are considerable for obtaining evidence of alignment with state curriculum frameworks and evidence of student learning.

Policy Issue: Professional Development

Concerns in this area included the development of staff—including teachers, technical support staff, curriculum staff, and administrators—in a wide range of categories to support effective use. A new staff position or role is that of remote site facilitator.

Also of concern is the fact that staff development means more than just training in specific roles. Participants noted that school district policy needs to provide funding for professional development, including not just one-time or introductory training but also sustained professional development opportunities as teachers become more experienced, and ongoing technical support during imple-

mentation. Also, institutions of higher education need to include in their teacher preparation programs knowledge of IVC and recognition of its role in teaching and learning. The major topic areas identified as important for teacher preparation included technical skill building, the changing roles of students and teachers, and integration of other technologies with IVC in instruction, incentives, and models of good staff development programs.

A summation of priorities by one discussion group was concise: “The panel believes there are plenty of resources on the Internet on staff development; the challenge is finding appropriate content and getting teachers to understand when to use technology. There is a need to inform, to provide awareness, support and training for school boards,

superintendents, school principals, and teachers. In providing professional development, it is

“In providing professional development, it is important to identify appropriate teachers. Teachers are now curriculum builders and need to know what to use, when to use it, and to be able to make it seamless.”

important to identify appropriate teachers. Teachers are now curriculum builders and need to know what to use, when to use it, and to be able to make it seamless.”

Training in tools and technique

The success of IVC is partly a function of expertise in the techniques of using the hardware and software tools. A first level of training “is just to make them aware of the equipment and how to dust it off and use it” said one discussant. It was observed that even a highly wired state like South Dakota still has a lot of teachers who don’t know what a network is, so the job of achieving minimum awareness is daunting.

A complete IVC system includes not only the video camera but also other tools such as a computer and a document camera, and teachers frequently have difficulty integrating the equipment. It is partly an issue of having time to play with the equipment after initial instruction. Another participant observed that “we have to work with them on a day-by-day basis; support has to be continuous.” Some teachers do not like to operate equipment, and in some situations an operator controls equipment for them. However, that is unrealistic in most situations, and most participants feel that teachers can and should learn to use the equipment.

One of the keynote speakers, Scott Sharer, made such techniques the centerpiece of his presentation, not only as the content of his presentation but also in his delivery. (View <http://neirtec.terc.edu/k12vc/symposium/speakers.cfm> to see Sharer video clips.) He made his presentation to the Dallas gathering through IVC from his office location in Tybee Island, Georgia, demonstrating the techniques as he talked about them. He observed that effective IVC is not about “face to face” but about “eye to eye” and demonstrated this by astute camera positioning and consistently looking into the camera. Even the experienced users of the technology at the symposium were amazed at his adept and effective use of the tools. In general, participants felt that effective IVC teachers were those who have mastered the use of the tools at hand, and that observing models of expert presentation like Sharer is an important part of staff development.

Other groups identified new staff roles needed to support IVC instruction, such as active facilitators at the remote video sites to help provide comfort with the technology and also to assist in providing feedback to the presenters over the network.

Assigning mentors—teachers who specialize in helping other teachers integrate distance learning—is one type of support that provides on-the-job staff development. In another example situa-

tion, a distance learning lead teacher is responsible for working with several schools as a support teacher. In the South Dakota system, the Interactive Learning Campus has teachers scattered across the state who only teach distance learning classes, and school districts are forming consortia for bartering expert teachers.

One participant described the importance of training teachers in facilitation skills, such as engaging students in discussion, a key skill in conducting successful IVC sessions. This includes strategies and techniques to help engage students in multiple sites, because students' attention may wander when they are not actively involved. A related issue is how to engage students in social, collaborative activities that require communication among students in an IVC site remote from the teacher's location. Some participants stated they maintain a Web-based environment to help communicate content, facilitate interaction, and manage threaded discussions. Several software systems containing tools to enhance such communication are available, such as WebCT, Blackboard, and others. Time is needed to make use of these tools effectively. In Arkansas, teachers conduct instruction four days a week, with one day free from video sessions to allow them to post Web content, update Web-based grades, and other noninstructional tasks. In addition to these Web tools that many find critical, other tools such as bulletin boards, chat rooms, and listservs also work in providing ongoing professional development. These modes of communication also serve as backup avenues at times when the video component is unavailable.

One group pointed out the importance of the teacher's appearance and style, saying that teaching style, bad or good, is exaggerated in a videoconference. The medium seems to magnify style and characteristics. An essential element may be the teacher's point of view, or self-perception.

"A talking head is a talking head, whether it's through video or not..."

While some presentation and organization skills can be taught, others are a function of personality. The “interactive” in IVC is very important, as it is in any live classroom setting. “A talking head is a talking head, whether it’s through video or not,” observed one participant.

Pedagogy, roles, and changing paradigms

Silverman’s keynote contrasted the “information delivery” paradigm of one-way video with the “engaged learner and teacher as guide” paradigm supported by interactive video. Participants, in their discussion of staff development issues, agreed that we should be changing the paradigm and encouraging project-based learning, thereby changing the teacher and learner roles. However, they also indicated there is nothing about the technology itself that ensures use of that approach. They said that professional development programs should lead teachers to take advantage of the interactive opportunities with the technology, as the following comments from the discussion indicate:

- “Professional development . . . needs to address the changing face of education and what their role will be over the next five to 10 years.”
- “Technology is not the point here. An interactive class is interactive with or without VC.”
- “You don’t have to build an activity around the videoconference; the videoconference should be part of a lesson.”
- “When is IVC appropriate and when not? That should be the question.”
- “When this tool is available, how do you make the best use of it? What is the optimal way to use it?”

- “Community sense is a part of good instruction and should be embedded into instructional delivery. It gets back to the idea that good instruction is good instruction. If you have a teacher who is skilled at providing engaged learning opportunities, the community interaction piece should be embedded into the instruction.”

It was suggested that staff development includes not only training of teachers but also the identification of different positions or roles to make using the

new medium more effective. One group identified a need for access to an instructional design specialist and for a mentorship arrangement between someone who knows how to develop effective videoconference courses and someone who doesn't. Teacher shortage is a major issue in that regard. When we are already short of teachers, especially qualified science and math teachers in small rural schools, how can we incorporate these new roles?

“An interactive class is interactive with or without VC.”

Strategies and models

Many designs for staff development programs were described during the symposium. We cite only a few examples here, but district planners should note that there are many more successful programs that can serve as models for program planning. Some of the Web sites provided in Appendix C will be helpful in this regard.

In the Arkansas SEA plan, instruction in equipment use comes first, followed by use of content. In particular, the plan addresses what can be done with the new technology that couldn't be done before. This training is conducted six months prior to teaching the actual class. The teachers then have six months to develop curriculum, observe another teacher teaching on the system, and learn classroom management techniques. These teachers actually work

for the state of Arkansas, so release time is not an issue. They are given time to train, and often a stipend to participate.

Allen Independent School District in Texas used the first six months of a grant period to do teacher preparation before installing any hardware. They identify “heat-seekers” to pioneer use of the new technology so that others will become interested after word of the new technology initiative spreads. Their process included:

- Redefining roles
- Establishing vision
- Finding “heat-seekers”
- Allowing teachers to use technology to meet their needs
- Modeling potential for teachers and administration
- Promoting the vision
- Planning for ongoing training (including time and funding)

The South Dakota SEA provides two plans. First is a four-week Technology for Teaching and Learning Academy, which includes a \$1,000 stipend for a teacher and a \$1,000 stipend for their school, to be used at the teacher’s discretion. Second is a three-week academy for distance learning, including a \$750 stipend for a teacher and a \$750 stipend for their school, to be used at the teacher’s discretion. These academies provide teachers with an understanding of design models that teachers use throughout the year. Follow-up is provided to teachers throughout the year using WebCT, a software package for facilitating course management. Teachers are taught how to use videoconferencing equipment through actual sessions on an IVC system.

Another component of some staff development strategies is to use IVC to bring courses and assistance from higher education institutions to help teachers look at IVC as part of their teaching strategies. This has an advantage in that university credit can be conveniently offered. However, a limiting factor is that the technology is not yet widespread in schools of education.

Staff selection and incentives

Several discussions centered on finding and recruiting teachers for videoconferencing, identifying several factors. Two important factors in creating an inviting situation are having a clear vision for the technology and administrative buy-in. In addition, just the opportunity for comprehensive training will make many teachers more comfortable from the start.

A visible support structure is critical for teachers using the systems. “Teachers need to be continuously supported throughout the process, and need to know that they are not just going to be sent out and left to the wolves,” said one group. In addition, a plan for motivating participation could include offering college credits for professional development, stipends for increased proficiency levels, extra pay for extra time, and release time or planning time.

There is also an issue of identifying teachers who are likely to be successful. In that regard, Arkansas uses a specific interview model for teachers coming into a distance education position. They look at how teachers handle stress, and candidates must demonstrate a five-minute lesson, using technology or not.

“Teachers need to be continuously supported throughout the process, and need to know that they are not just going to be sent out and left to the wolves...”

One potential problem identified in one group was lack of follow-through. Although teachers are often excited after training about the application of videoconferencing, not all of them actually implement what they have learned. Lack of time, coupled with pressures to “teach to the test” are two key reasons identified by symposium participants.

Using IVC to deliver professional development

In the discussions of preparing teachers to use IVC, a number of participants described their use of the technology to carry out staff development, both in IVC technology and in other staff development areas. The director of Vision Athena, the statewide support organization in Indiana, said that using IVC for professional development purposes is probably the organization's fastest growth area and is driving much of the expansion of IVC in schools there. The technology offers the same advantages for training teachers as for teaching students. Several benefits of using IVC technology to improve the delivery of professional development include connecting with outside experts who are too far away or too expensive, demonstrating promising or exemplary practices, and decreasing the need for teachers to travel. It was suggested that this is not a new topic and that we can draw from documented best practices in adult learning using technology.

One group questioned how technology can support all the staff development issues occasioned by NCLB. They asked, "With respect to job-embedded professional development, can technology play a supportive role in getting everything that is needed to improve student performance?" Although they did not make specific recommendations, it is clear that they felt IVC could be a significant and efficient avenue for providing needed information to teachers and other district staff in a timely manner at a location convenient to their work sites.

Policy Issue: Assessment

Assessment and research needs were intermingled in discussions. Some participants, in fact, used the terms as if they were the same issue—for example, describing the need for aggregating student performance data as a research task. While we attempt to separate

them here, it is certainly the case that data from assessment activities might also contribute to research in assessment, and that the development of assessment tools might require some research. Assessment is an issue made even more critical by the national emphasis on regular testing of student progress.

Participants expressed a need for tools to measure the effect of interactive video on learning, especially in the non-course applications seen as valuable by many participants. A major concern in this area is resolving questions about the implications of NCLB legislation for testing, and the connection between IVC activities and standardized testing. Participants said that we must provide research-based information and that measurable achievement is the justification for the expense of the research.

On the other hand, there was a high level of frustration expressed in several discussion groups regarding the notion that we must justify IVC expenditures in terms of increases in test scores. As one group expressed this frustration: “We know what effective classrooms look like; there are a lot of clear roadmaps as far as what works in class. We don’t ask how textbooks are affecting student learning. I worry about traveling down roads that are asking the wrong questions. When is IVC appropriate and not? That should be the question.” A large body of information from higher education and adult education indicates that students do at least as well in courses by video as in face-to-face.

“When is IVC appropriate and not? That should be the question.”

Two groups called for establishing a way for participants to collaborate in developing a national data repository, with a mechanism for input of statistics nationwide to use in documenting penetration and impact of programs. South Dakota, for instance, has a central scheduling system, so it has data on student progress, suc-

cess, and completion for all courses scheduled. Some local districts collect data for themselves, while several states aggregate data. Other agencies, such as the Indiana Museum of Art, are known to keep data on the numbers of counties, schools, and students they reach so that there is a body of impact information on which to base a collection. SEA staffs in particular face the need to get impact data for legislative presentations. Collecting and disseminating such data is another possible function of a clearinghouse described earlier in this report.

The “birds-of-a-feather” group on the topic of assessment suggested other factors to evaluate and methods to gather the data, as in the following questions: What is it that kids get out of collaboration? How do you assess motivation? Is it enough to say to superintendents that kids “seem” more motivated? How do you measure the unanticipated results of distance learning? What is the result of kids communicating with folks outside their own communities? Are kids “across the tracks” different? Is IVC effective in, for example, spurring marginalized kids to get suddenly “turned on?”

It was observed that capturing individual stories of success—that is, anecdotal evidence of IVC’s impact—hasn’t happened. One participant said that they are looking at obtaining feedback from kids who went off to college, citing a student response that the best thing about her high-school education was an IVC college course that gave her the confidence to move on to college.

Over all, participants argue that qualitative data (perceived value and impact) are as important as quantitative data (such as test performance and absences), and that it is unreasonable to tie test performance changes directly to the technology because we don’t ask that of other tools in the instruction process, such as face-to-face instruction.

Policy Issue: Research

As an additional item to prepare participants for the symposium, the sponsoring RTECs developed a review of the literature and research in interactive videoconferencing. The review showed that most of the recent research in distance education is in environments using one-way video and with higher education as the audience. Although some of the results are applicable to K–12 settings, many of them are not, and there is very little research in situations involving interactive video. Dr. Michael Moore, editor of the *American Journal of Distance Learning*, delivered a keynote address in which he summarized the major issue areas being addressed in distance education research. (See <http://neirtec.terc.edu/k12vc/symposium/speakers.cfm> to view Moore video clips.) He also observed that although the research topics themselves are likely relevant, the higher education context for much of the research leads to many questions about the relevance of the results to K–12 settings. Another part of the context is the focus on courses and course delivery, which might not address the K–12 applications of most concern at this symposium: non-course supplemental and enhancement activities.

Much of the discussion about research centered on developing the questions that need to be addressed, as exemplified in the following list:

- What is it we really want to know that we don't know now?
- Does IVC improve student performance?
- Should identifying best practices be a major thread of IVC research?
- When is IVC appropriate and when is it not?
- When this tool is available, how do you make the best use of it?
- What is the optimal way to use it?
- What happens to learning outcomes and test scores as a result of bringing supplemental content into the classroom?
- How eager are teachers to continue to use this technology?

A focus in one group was on the unanticipated results of distance learning, as embodied in questions such as, What are the results of kids communicating with people outside their own communities? How can these results be measured? In what ways are kids in other social environments the same and different? What effects do those variables have on the delivery and outcomes of IVC?

Discussions of content that enhances and is integrated with classroom instruction produced further questions and concerns. Participants expressed a need to find ways of measuring the “value added” aspects of IVC. They know it produces excitement and motivation, and they hope it helps with problem solving. They talked about the need to align with educators who are exploring problem-based and project-based learning and then examining how those strategies look when videoconferencing is introduced. If students work on projects, for example, can they apply that knowledge elsewhere? How effective is IVC compared to other technologies in the delivery of supplemental content?

One individual expressed an area of research not otherwise addressed: “I’m interested in teacher change, perception of self, the introduction of technology, the reflective image and teacher change—change the hierarchy in the classroom and teacher’s perception of self through the lens of TV.”

In addition to the research needs, it was also expressed that it could be necessary to fund scientific research designs and models if those continue to be the federal requirement for definition of success and justification for funding.

A small group of participants highly interested in the need for research met to consider planning a national research agenda, to set priorities, and to explore opportunities to do some of the research on a collaborative basis. It was determined that a group should be formed to follow up the symposium by collaboratively

designing a research proposal to obtain a grant. That effort should include the development of a concise research-based summary on effectiveness and impact that can be used to procure funding.

Moore reported that a similar conversation occurred many years ago among higher education institutions. At that time, distance education was not a field of study in the United States. A first conference was held, during which the need for a national organization was established, and publication plans and a research agenda began to be developed. He volunteered to put out a special issue of the *American Journal of Distance Education* on K–12 IVC if he had four good pieces of research on the topic. He described DEOS, the Distance Education Online Symposium, a listserv developed for higher education distance educators. However, he suggested it might be better to maintain integrity by having such an activity for K–12 practitioners alone.

Policy Issue: Planning for Facilities and Networks

It is customary for providers of content to mandate the schedule and starting times for classes or events delivered over IVC. Scheduling is a huge issue for many states and districts because it is difficult to schedule synchronous programming for use by several schools. The time of day when students are available for instruction varies both within a state or time zone and across time zones.

One participant indicated that in his district, IVC is used least in the high school because of nearly insurmountable scheduling difficulties. Scheduling across six sections makes IVC extremely problematic. Few if any content providers appear to be rebroadcasting courses in the event a student is absent or for the benefit of other schools or learning groups that have schedule conflicts and would like to take advantage of the content. One solution is demonstrated

by the University of Oklahoma, which records both receiving and sending sites and saves the tapes. They have release letters signed so that students know as part of the contract that the course may be rebroadcast.

Facilities planning—including the location of equipment as close to the users as possible—is another key factor in successful videoconferencing. The idea of an elementary teacher having to transport students to the high school to use a special IVC room was anathema to the participants. They said: “We have to get away from the attitude that there is the room and the unit. You don’t

“We have to get away from the attitude that there is the room and the unit. You don’t have to build an activity around the videoconference; rather, the videoconference should be part of a lesson.”

have to build an activity around the videoconference; rather, the videoconference should be part of a lesson.” It was clearly con-

sidered highly desirable to have IVC integrated into classroom teaching and learning with as little disruption as possible.

There was a strong feeling that if teachers are going to teach, they need to have direct access to a document camera, VCR, projector, and other necessary equipment at the time and place of instruction. However, given the expense of the equipment, planners cannot realistically expect to have it in every classroom. A more realistic goal for a school district planning to use IVC would be to place a facility in each building. If the district also wired every room and made the video equipment portable, an effective and available system could still be achieved.

For most practitioners, high bandwidth (high-speed transmission) is one of the keys to successful interactive video because of the need for high levels of motion and/or switching between the active sites. A

major problem voiced by participants is that many schools don't yet have sufficient telecommunications bandwidth to carry IVC satisfactorily. There have been a number of attempts to provide two-way interactive video on low-bandwidth systems, typically using dial-up phone connections, inexpensive cameras connected to desktop computers, and software such as CUseeMe. Although successful connections are commonplace, their utility for instruction is limited because the low transmission speed results in incomplete or unclear video displays if the subject is moving, and delay or lack of synchronization between speaking and lip movement. Also, having more than two sites in a videoconference is common and necessary, but not well accomplished in low-bandwidth situations. One discussion group noted, "We can't teach with the latency (delay) that we had (at the symposium) today." In another group, a service supplier noted: "Only the ones that have upper bandwidths can we even work with, so there is a question of who—what populations—are we working with." A participant from New Hampshire, for example, reported that ISDN (Integrated Services Digital Network)—a type of high-speed phone line—is not much of an option in their area, and high bandwidth Internet Protocol (IP) is not an option for many rural schools. Thus, having the technical access to broadband lines is a key to having access to meaningful interactive instruction by video.

Participants represented 26 states, and they reported great disparity in technical access, not only from state to state, but even between districts within many states. Some states provide statewide broadband networks, but in many states all connectivity is within the purview of the local district. In those situations, schools desiring to work with each other can have several different kinds of networks, which create additional access issues because of possible incompatibility. Some schools are looking at hybrid instructional delivery approaches that incorporate asynchronous video, DVD, and the Internet. Their goal is to avoid depending only on live interaction for a full class period. In this approach, live interaction can be used as appropriate, and line costs are reduced.

While many video networks operate on dedicated lines, participants are looking at video over IP as a way of cutting costs and achieving wider connectivity. Not many organizations are using it yet, because of problems such as insufficient bandwidth in their connection and poor video transmission resulting from network traffic competition at peak times. One discussion group agreed that “ISDN is a stable format right now, but IP is the future and coming very soon as we work to get the kinks out.”

Looking to the future, keynoteer Dr. Ken Klingenstein, project director for the Internet2 Middleware Initiative, described the development of Internet2. (View <http://neirtec.terc.edu/k12vc/symposium/speakers.cfm> to see Klingenstein video clips.) Middleware—the software behind user interfaces—is the way to make the Internet a useful resource to users while providing them a greatly enhanced interface, according to Klingenstein. An example is the development of video directories that make creating video connections as easy as a phone call. These directories will contain all the technical information needed to connect sites. Users will be able to click on a site name and the video equipment will configure itself without users needing to know all the technical details. However, participants saw Internet2 as a distant possibility, partly because there is only limited access in many schools to the current Internet, and partly because they expect very few K–12 applications to be developed without the involvement of the K–12 practitioners. They see interactive video as their “killer app” (that is, the most compelling application) of Internet2. They believe that as legislation and policy go forward around Internet2 development, experienced K–12 users need to be involved, and they want to be sure that policies from the FCC and the U.S. Department of Education take them into account. They say that just as with cable, there needs to be a clear commitment to K–12 to provide a base level of education bandwidth.

Policy Issue: Funding

As noted earlier, IVC systems and high-bandwidth networks are expensive, and it is difficult to show a direct impact of a technology on student test scores. Yet, participants believe that the value of the learning opportunities is worth the cost. Finding financial support is challenging, however, and discussions addressed funding strategies in only a limited fashion. In addition to significant front-end costs for equipment, bandwidth, and professional development, there are ongoing costs in sustaining IVC programs.

To address one part of this issue, some districts and states are experimenting with barter systems. In New Hampshire and Oklahoma, for instance, two or more entities each develop and share content with the others. Another option is providing professional development opportunities for teachers in return for student instruction. However, there is no structure or roadmap for such a system on a wider statewide or national scale. A major question in barter is, “Are the partners getting equivalent value?” One issue is the perceived equivalence in quality: The procedures and standards applied to instructional design and development by those bartering need to be seen as comparable by all partners. Also, while bartering courses is easy to conceptualize, there are many non-course IVC activities that are not as neatly packaged and might not be as easily bartered as courses. For example, there is lack of reciprocity in some video opportunities such as interaction with a museum research staff, in which the museum wants nothing in exchange but must charge for its service. One group observed that “the needy are really needy, and sometimes a barter system doesn’t work out.” In some states, organizations such as museums are subsidized for education outreach within the state, which suggests the possibility of creating interstate barter arrangements in which schools in one state can have access to IVC resources originating in another.

The lack of federal funding in support of IVC was raised by a number of participants. In particular, they believe that E-rate support should be expanded to allow support for IVC equipment and cabling within the classroom. Currently, E-rate support can be used only for high-bandwidth lines, routers, cabling, etc. up to the classroom wall.

Toward a Policy Framework for Success

What are the implications for K–12 education agencies of these findings from current IVC practice? The pioneering work in the field has shown—both by its successes and its failures—that policy matters. Practitioners, by their problem-solving activities along the way, confirm that policy counts. Policy at the school, district, regional, and SEA levels provides commitment and a framework for successful implementation. In this section, we suggest questions that policymakers should address.

School Districts

The scope of policy development in school districts depends to some extent on the national and state strategies and frameworks within which they operate. For example, the strategy of a school district in Texas needs to take into account the statewide network and services funded by the state and made available through their regional educational service center. An Idaho district, on the other hand, must establish its own broadband access and provide staff development services without benefit of a state or regional framework. In other words, districts should ask themselves all the questions below, even if the answers to some of them are “the SEA does it” or “the federal government provides it.”

Goals, expectations, needs

How should we view the use of IVC technology? What is the role for IVC in instruction: courses? instructional enrichment? district operations and communication? Are there particular district needs such as a lack of certain courses that initial efforts should address? Using district and SEA technology plans that are already in place as a result of E-rate, TLCF, and Enhancing Education Through

Technology (EETT) requirements, a broadening of current technology policy might suffice in many districts.

Audiences

Who will be served? Will the focus be on certain age levels and curricular areas of use, such as elementary and secondary, or science and social studies? Or will usage be open to all, with teacher interest to be the determiner? Will there be a phased plan of access to the content and opportunities?

Access to the technology

Where will IVC units be placed, and what level of broadband communications service will be provided? In which buildings and rooms will access to IVC be installed? Will community organizations be allowed to use the facilities?

Professional development and support

Who can receive training? What aspects of use will be covered? How will it be offered? Are new staff positions required, or can adjustments be made to current position definitions? Will current technology support staff be given new assignments or workloads?

Staff selection and compensation

How will new roles and skills affect teacher contracts? Is special compensation warranted for those who teach courses in this medium? Are class loads or prep time increased over regular classroom assignments? Is an extra prep period adequate compensation? Can current extra pay policies be expanded to include teachers using IVC? What policies or strategies need to be in place for the selection and compensation of technical and instructional support staff?

Evaluation

What assessment and evaluation procedures will be required of IVC activities? What questions need to be answered? What data should be collected?

State Agencies

A number of states are supporting IVC in various ways. In some, the SEA is the primary locus of all support. In others, the state telecommunication authority plays the lead role in the provision of bandwidth, while the SEA handles curricular and staff development issues. In some cases, the state provides only the broadband network, leaving other aspects unsupported. An SEA might provide content development or staff development from its staff, or it might fund a private agency to provide support services.

All of these models were represented at the symposium. It is clear from the experience of practitioners that appropriate state roles include:

- Providing a statewide broadband network
- Planning and conducting staff development programs
- Facilitating sharing of content within the state or across state borders
- Establishing a structure for correlating content with state curricular standards

In many states, existing policies in statutes or regulations are applicable to the distance education enterprise and thus to IVC. They commonly have to do with teacher certification, award of credit, and quality of instructional materials. These roles are already established as important state functions.

Federal Agencies

There are activities which are broad enough in scope that a federal presence is either logical or necessary. One of these is the support of access to information on a national or international basis. The major need identified at the symposium is for a nationwide, Web-

based clearinghouse for IVC, with particular emphasis on content availability. The need and definition of functions for such a clearinghouse are provided in detail at a later point in this paper.

A second activity is the fostering of a nationwide community of practice, starting with the establishment and management of an IVC listserv for K–12 practitioners, including not only symposium attendees but anyone in the nation who is involved in the use of IVC systems in schools and districts. Staying in touch with each other to share experience and knowledge is important to all participants. Such a listserv could easily become a component of the clearinghouse proposed above.

Major Recommendation: An Information Clearinghouse

A clearinghouse to provide educators and policymakers with critical information in planning and implementing IVC was repeatedly identified as one of the highest priority needs during discussions at the IVC symposium. Participants suggested that a clearinghouse should be designed to house and disseminate current and comprehensive information on all aspects of IVC, particularly content, staff development, and assessment. The comments and suggestions from discussion groups and the birds-of-a-feather group dedicated to this topic are summarized below.

What information should a clearinghouse collect and provide?

Many practitioners feel isolated and want to find out what is going on nationwide or in locales like theirs. They want to see descriptions of the approaches of other districts or projects in order to learn from them. As one group put it: “Individual stories are important to people. We don’t have a lot of good narratives being told. It’s also important to tell of the noble failures.” The Symposium Web site has begun a collection of such stories in the case studies developed as a pre-symposium resource (see Appendix C). To facilitate the interchange of experiences such as these, a clearinghouse should provide access to organizations and contacts both nationwide and worldwide, with Web links to schools, SEAs, and other agencies.

Practitioners need an organized way of finding content providers, especially providers of high-quality content. This might be accomplished through a centralized database of available courses and content, accompanied by a rating mechanism. As one group said,

“...it would be helpful to have a centralized mechanism for input of statistics nationwide to use in documenting the penetration and impact of programs.”

“We are lacking the *Consumer Reports* of technology.” The desired

types of information also included research results and plans, white papers, usage statistics, and evaluation methods and results. Participants also said that “it would be helpful to have a centralized mechanism for input of statistics nationwide to use in documenting the penetration and impact of programs.” For school boards and other policymakers, the importance of documenting the impact of the videoconferencing delivery mechanism on student learning cannot be underestimated.

A point made several times in different discussions is that many practitioners want mechanisms to facilitate continuing contact with their peers, and that schools and districts thinking about or planning for IVC want to be able to contact experienced users who can help them avoid pitfalls. Currently, the common way of accomplishing that is for a person to assemble a personal list of e-mail contacts based on encounters at conferences. However, many attendees were pleased to find at the symposium that there is a far larger community of experience available than they knew about. It would be possible and relatively simple through a clearinghouse to support communities of practice in IVC by initiating one or more listservs that would be comprehensive in coverage and open to any interested person, whether experienced or not.

What are the design considerations?

Participants expressed a need to keep an IVC clearinghouse specific to a K–12 audience: teachers, coordinators, and administrators. There is a general belief that the available information avenues are dominated by higher education institutions, with an overemphasis on course delivery for credit. They think a clearinghouse needs to be national in scope and designed to link people to each other as

well as to the information. Thus, it should be more than just a collection of lists, and include a discussion board for practitioners so that experiences are shared and mistakes are not repeated. As one group expressed it, having a central repository would constitute the mother lode of IVC information—a place where K–12 experts could share their knowledge, practitioners could trade experience, and novices could tap into the collective wisdom. The term “database” was used a number of times, with the implication that information collections should be searchable.

Quality of content represented in a clearinghouse, whether for sharing or purchase, is another concern. Important design issues raised included the accuracy of the information and who will review it, along with the need for frequent updates.

Some discussion centered on the ownership and location of a clearinghouse. RTEC participation and support was suggested, as well as the possibility that it could be a function of the U.S. Department of Education. It was also suggested that management of the clearinghouse could be handled by a user association or a professional organization. Good mechanisms for outreach to both practitioners who can contribute, as well as new users and planners who are not yet involved, are another key design consideration, as are marketing and communication capabilities.

From the discussion, it is clear that although IVC experts and practitioners have a variety of notions about what an IVC clearinghouse should provide, but they do not necessarily envision a comprehensive and staff-intensive model like an ERIC clearinghouse. Rather, a well-designed Web site would satisfy many. And while satisfying the range of information needs could require a large effort and expenditure for collection, organization, and maintenance down the road, many people would be happy with immediate implementation of a limited set of information categories. Some information could reasonably be expected from user contributions, reducing

staff time needs to some extent. Models of organization and content suggesting components for the design of a Web-based clearinghouse may be found in the sample Web sites in Appendix C.

Policy Implications

A Web-based clearinghouse for K–12 videoconferencing is a clear need if the potential for the improvement of instruction through that medium is to be realized. It is also clear from the successful implementations across the nation that many schools—whether small and remote or large and urban—can benefit. Information in content availability, promising instructional practices, professional development, and assessment methods and data are the biggest immediate needs. There are a large number of Web sites developed and supported by schools, regional agencies, and SEAs that attempt to gather such information for their constituents.

However, their responsibilities are not for the nation as a whole, and they vary greatly in their coverage and ability to maintain currency and accuracy. Thus, an effort of national scope to bring together and maintain disparate collections according to agreed-upon standards is an essential next step in the development of IVC as an important technology for K–12 education.

Appendix A

Symposium Participants

- Doug Adams, High Plains Regional Technology in Education Consortium
- Bill Adkins, Allen Independent School District
- Vicki Allen, Allen, TX
- Shannon Amiotte, South Dakota Department of Education and Cultural Affairs
- Marv Bailey, Center for Interactive Learning & Collaboration
- Timothy Barshinger, IDSolutions
- Tammy Bauck, South Dakota Department of Education and Cultural Affairs
- Steve Baxendale, Pacific Resources for Education and Learning
- Lea Bentley Castillo, NASA-Johnson Space Center
- Ruth Blankenbaker, Center for Interactive Learning & Collaboration
- Michele Bouchard, Jason Foundation for Education
- Karen Brown, Blue Ridge Virtual Governor's School
- Jerome Browning, Alabama Department of Education
- Mary Burns, SouthCentral Regional Technology in Education Consortium
- Jim Christensen, Western Hills Area Education Agency
- Christy Clemons-Rodgers, Carnegie Hall, West Virginia
- Dawn Colavita, Center for Interactive Learning and Collaboration
- Debra Colley, Southwest Virginia Education & Training Network
- Pat Crawford, Texas Education Service Center, Region XI
- Debi Crawford, SUPERNet Consortium
- Kirk deFord, Northwest Educational Technology Consortium
- Vicki Dimock, SouthCentral Regional Technology in Education Consortium
- Geralyn Elmore, Manor Independent School District
- Paul Facteau, Gateway Regional School District
- Lucy Ferron, Mississippi Educational Broadcasting
- Richard Ford, VTEL Products Corporation
- Debbie Fredrickson, Austin Community College
- Lisa Fuller, North Central Regional Educational Lab, Educational Technology Consortium
- Susanna Garza, Texas Education Service Center, Region 20

- Philip Girard, Crotched Mountain Foundation
- Gary Graves, Northwest Educational Technology Consortium
- Sharon Gullett, Texas Regional Collaboratives for Excellence in Science Teaching, Reg. VII
- Charlee Hagan, Arlington Independent School District
- Randy Hall, Carnegie Hall School
- Seymour Hanfling, Northwest Educational Technology Consortium
- Dan Hawkins, Idaho State Department of Education, Bureau of Technology Services
- Marilyn Heath, SouthCentral Regional Technology in Education Consortium
- John Heemstra, Interactive Learning Campus
- Julia Heighway, Center for Interactive Learning & Collaboration
- Mark Heilmann, South Dakota Department of Education and Cultural Affairs
- Peg Henson, South Dakota Department of Education and Cultural Affairs
- Sandra Hines, Burleson Independent School District
- Laurie Hogle, Texas Education Service Center, Region XI
- Kim Hughes, SouthCentral Regional Technology in Education Consortium
- Martin Huntley, The Education Alliance, Brown University
- Harriett Jackson, Texas Education Service Center, Region 20
- Lesley Johnson, Northeast & Islands Regional Technology in Education Consortium
- Jane Kellogg, Kellogg Consulting, LLC
- Belinda Kittrell, Arkansas Department of Education Distance Learning Center
- Kenneth Klingenstein, Computing and Network Services, University of Colorado at Boulder
- Richard LaGow, Texas Education Agency
- James Lake, CompView
- Matthew Lawyer, Birdville Independent School District
- Sheryl Lipski, Southern Oregon Education Service District
- Deb Little, WestEd Regional Technology in Education Consortium
- Elaine Lucas, Center for Interactive Learning and Collaboration
- Jack Lumbley, SouthCentral Regional Technology in Education Consortium
- Sandy Lyons, Manor Independent School District
- Gerri Maglia, Education Service Center Region XI
- Barry Mansfield, Mid-Atlantic Regional Technology in Education Consortium
- Danny Martinez, SouthCentral Regional Technology in Education Consortium
- Jay Matheson, Center for Interactive Learning & Collaboration

- Daniel Matthews, Cascade Consortium
- Jean May-Brett, Louisiana Educational Television Authority
- Jan McLaughlin, New Hampshire Department of Education
- Michelle Mehlberg, South Dakota Department of Education & Cultural Affairs
- James Monti, West Warwick Public Schools
- Michael G. Moore, Pennsylvania State University
- Hall Morrison, Louisiana Center for Educational Technology, Louisiana
Department of Education
- Joel Partin, Wylie Independent School District
- Tony Payne, Tuscarora Intermediate Unit 11
- Rosemarie Piccioni, Carnegie Hall
- Denise Pinder, Birdville Independent School District
- Marci Powell, VibrantC, Inc.
- Petra Ramirez, SouthCentral Regional Technology in Education Consortium
- Kecia Ray, Vanderbilt University
- Michael Rooney, Gateway Regional School District
- Jim Rose, Oregon Public Education Network
- Pete Royer, Little Crow Telemedia Network
- Kristina Shelley, Northwest Tri-County Intermediate Unit
- Melody Shivers, Richardson Independent School District
- Stanley Silverman, New York Institute of Technology
- Enid Simmons, United States Department of Education
- Lora Smith, Missouri Distance Learning Association
- Linda Snapp, Allen Independent School District
- Matt Treamer, North Country Education Foundation
- Kathy Veal, Bursleson Independent School District
- David Walddon, Washington State Office of Superintendent of Public Instruction
- Claudia Wheatley, Center for Interactive Learning and Collaboration
- Wendy Wilkerson, Indianapolis Museum of Art
- Bill Williams, Mississippi Authority for Educational Television
- Scott Williams, Center for Independent and Distant Learning at the University
of Oklahoma
- Carol Willis, Texas Education Telecommunications Network
- Jan Zanetis, Vanderbilt Virtual School
- Christy Ziegler, Advanced Learning Technologies, High Plains RTEC

Appendix B

Symposium Speakers and Panelists

Keynote Speakers

Dr. Michael G. Moore is the editor of the *American Journal of Distance Education*, a member of the faculty of the College of Education of the Pennsylvania State University, and founder of the American Center for the Study of Distance Education at Penn State.

John Bailey is the director of the Office of Educational Technology in the U.S. Department of Education, responsible for implementing educational technology policy at the national level.

Dr. Ken Klingenstein serves on the senior staff of Internet2 and is project director for the Internet2 Middleware Initiative, responsible for disseminating middleware developments and fostering interoperability through standards and workshops.

Scott Sharer is the vice president for educational development at Logical Transitions Inc. in Tybee Island, Georgia. In addition to offering a range of training and staff development services in videoconferencing for organizations, LTI has a commitment to schools via the Virtual Videoconference Fieldtrip Program.

Dr. Stan Silverman is the director of the Technology-Based Learning Systems Department of the New York Institute of Technology. He is also director of a nonprofit consortium called the Educational Enterprise Zone® (EEZ®).

Panel Members

Panel I: “Promising Instructional Applications of IVC”

- Organizer: Alan Feldman, NEIRTEC, Cambridge, Massachusetts
- Moderator: Marilyn Heath, SCRTEC, Austin, Texas
- Bill Adkins, Associate Superintendent for Curriculum and Instruction, Allen Independent School District, Allen, Texas
- Jim Monti, Coordinator and Standards Coach, West Warwick, Rhode Island
- Randy Hall, Project Director, Carnegie Hall School, New York City, New York
- Scott Merrick, Teacher and Lower School Technology Coordinator, University School of Nashville, Tennessee

Panel II: “Promising District-level Applications of IVC”

- Moderator: Seymour Hanfling, Director, NETC, Portland, Oregon
- Joel Partin, Director of Instructional Technology, Wylie Independent School District, Wylie, Texas
- Dan Matthews, Project Director, Cascade Consortium, Orondo, Washington
- Sheryl Lipski, Supervisor, Technology Services, Southern Oregon ESD, Medford, Oregon

Panel III: “What It Takes To Make IVC Successful: Policy Perspectives From State Administrators”

- Moderator: Vicki Dimock, Director, SCRTEC, Austin, Texas
- David Walddon, Interactive Video Supervisor, Washington Office of the Superintendent of Public Instruction, Olympia, Washington
- Lucy Ferron, Director of Distance Learning, Mississippi Educational Television, Jackson, Mississippi
- Belinda Kittrell, Program Manager, Arkansas Department of Education Distance Learning Center, Maumelle, Arkansas

Appendix C

Web Sites Offering Further Insights

The first site noted below was designed by NETC, SCRTEC, and NEIRTEC as their collaborative Web site for symposium activities. The preliminary policy and research review papers, the database of case studies, the symposium program, and follow-up activities are located there. Video clips from major speakers' presentations are also accessed through this site— <http://neirtec.terc.edu/k12vc/>


The following sites are selected to be a representative sample of Web sites for schools, regional service centers, and statewide and international organizations. They provide information resources and examples of the level and types of IVC usage in schools. They include aspects of the functions of the clearinghouse proposed by symposium participants, and provide many additional Web linkages.


- <http://www.netc.org/digitalbridges/>
Northwest Educational Technology Consortium
- <http://www.nassauboces.org/dln/videoconferencing/>
Long Island, NY, region
- <http://www.cesa10.k12.wi.us/dl/>
Western Wisconsin multiregion network
- <http://www.swing.k12.wi.us/isdn/>
Southeast Wisconsin network
- <http://www.twice.cc/fieldtrips.html>
Michigan statewide association for two-way interactive communication
- <http://www.visionathena.org/pub/index.asp?cp=events,search>
Indiana state videoconferencing network
- <http://csd.org/newlinks/newlinks.htm>
Cooperating School Districts consortium, St. Louis, Missouri
- <http://www.vceducation.org/index.htm>
Von Steuben High School, Chicago
- <http://www.global-leap.com/>
United Kingdom site with additional global coverage
- <http://iris.nyit.edu/~eez/>
The Educational Enterprise Zone site
- <http://www.uwex.edu/disted/k12.html>
Distance education clearinghouse of the University of Wisconsin—Extension

Notes

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Technology in Education Consortium

Northwest Educational 
Technology Consortium

South Central Regional 
Technology in Education Consortium