Videoconferencing On-Line: Enhancing Communication Over the Internet

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Editor's note: Inspired by "Videoconferencing On-Line," my family tried an on-line video conference to connect our University of Chicago daughter with a family party in California. With the author's advice and technical assistance from computer jock relatives, it worked! I'm looking forward to using it professionally as well as personally.

Videoconferencing technology allows geographically disparate parties to see and hear one another—across campus or around the globe—usually through satellite or telephone communication systems. It is typically an expensive undertaking involving costly equipment, high user fees, and elaborate infrastructure, often including a dedicated videoconferencing room. These costs and the required preparations for a videoconference have limited the number of potential users.

A developing new technology is now bringing videoconferencing within the reach of faculty, students, and practitioners. Free or inexpensive software programs are available that allow videoconferencing on-line over the Internet, with no satellite or long-distance charges.[1] With only this software and a small, relatively inexpensive personal camera plugged directly into a personal computer, individuals can videoconference through their computer screens with any similarly equipped users worldwide.

I use Internet videoconferencing to communicate with colleagues on campus and throughout the world, to consult, and to teach. While attending the AERA meeting in New York, I taught my Stanford students in California. In addition, office hours are now possible from a distance, when I'm traveling or when students are in distant locations. In my on-line ethnography classes,[2] Internet videoconferencing is enhancing our educational experience, allowing a more immediate, more interactive form of contact than e-mail. We plan to experiment with this tool in the new evaluation program beginning at Stanford next year to supplement classroom activity, regular office hours, and seminars. We also plan to use it in evaluation projects to conduct follow-up interviews and observations at remote sites. Currently, I am preparing to present an evaluation workshop from my office at Stanford, California, for the California State Department of Education in Sacramento. This interactive medium thus is enabling me to maintain my campus schedule of duties and appointments and to avoid time lost to travel.

Internet videoconferencing has other, less tangible benefits as well. Electronic communication is a little more personal and a lot more effective when you can hear the nuances of tone and see nonverbal "language" such as gestures and expressions, cues you normally depend on in face-to-face interactions. Videoconferencing also enhances collegial communication, particularly in preparation for professional association meetings and during multi-site research projects. Illustrations, maps, book covers, and physical settings can be shared instantaneously. The implications for international cooperation are considerable. I am working with colleagues in South Africa to use Internet videoconferencing to extend their empowerment evaluation[3] program in association with the Independent Development Trust's 1000 School Project.[4]

Software and Hardware

A particularly useful and inexpensive videoconferencing setup combines CU-SeeMe software[5]—available in Macintosh and PC formats at no cost from Cornell University (see below) and designed for Internet use—with a digitizer camera, such as QuickCam by Connectix (cost: approximately $100).[6] This is one of the least expensive digitizer cameras on the market. It provides acceptable black-and-white viewing, with frame rates of up to 15 frames per second, transmitting data through the serial port at two megabits a second.

Using this setup, I have enjoyed simultaneous conversations with colleagues in Stockholm, Seoul, New York, San Diego, and Tokyo. Icon buttons allow the user to talk either privately with an individual or as a member of a group videoconference. A picture of my computer screen during one such videoconferencing session is provided in Figure 1.

Many features common to videoconferencing software are worth exploring. Video and audio interaction can be supplemented with written communication in a talk window. One can e-mail brief, private messages to individual colleagues during a group videoconference or present a written piece of text for group comment. This feature is particularly useful when one is dialing up from a modem at home (instead of connecting directly from an Internet protocol address in the office), where sound or voice is seriously degraded.

Another feature is image reversal. An icon reverses the picture you send,

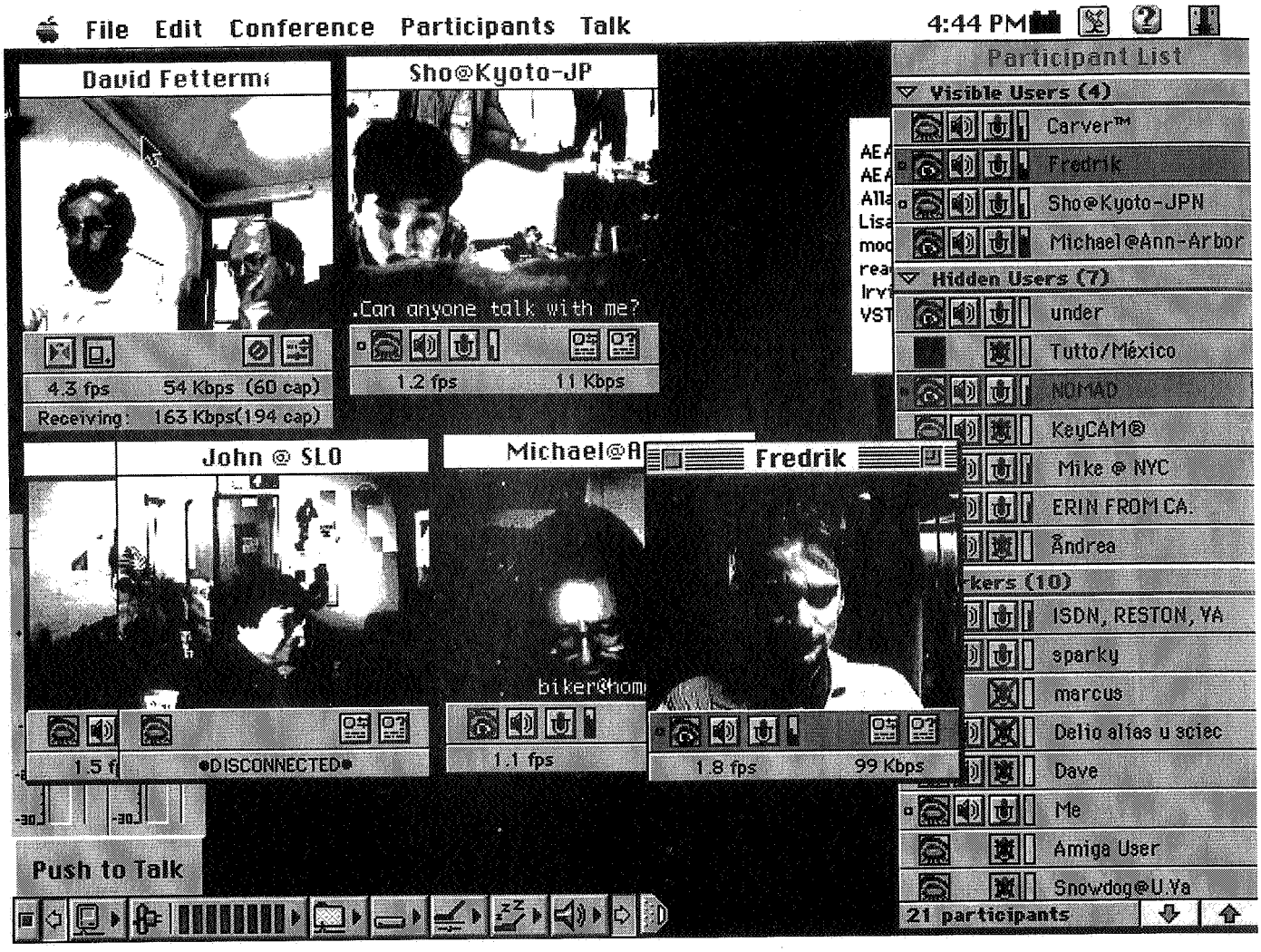

FIGURE 1. *Computer screen snapshot of colleagues speaking to one another from Stockholm, Seoul, New York, San Diego, Tokyo, and Stanford. Colleagues can see one another by selecting a participant from the "participant list" in the right-hand column—initially under "hidden users." Once selected, "hidden users" become "visible users." Colleagues can speak to the entire group by pressing the "push to talk" button in the bottom left-hand corner. Selecting the microphone icon under each picture allows individuals to speak to one another privately.*

which is particularly useful when connections go through a reflector site that presents a mirror image. For example, I showed one colleague the flier for my new book about empowerment evaluation. Once we found the reverse image-icon, my colleague was able to read the flier correctly.

An individual microphone icon, which allows private "side" conversations during a group videoconference, is another useful feature. I sometimes use this option to follow up on individual interests or suggest a course of action without disrupting the flow of the discussion.

Setup

Setting up Internet videoconferencing is fairly simple. The software is user-friendly, and documentation for its use is available.[7] In addition, a visual guide for CU-SeeMe is available at the following Internet location: http://www.jungle.com/msattler/sci-tech/comp/CU-SeeMe/usersguide/index.html A few basic instructions about use and generally available hardware and software are all that most computer-literate users will need.

For a Macintosh computer, the basic setup requires System 7 or higher, a color monitor (or 16 shades of gray), an Internet protocol network connection, CU-SeeMe software, Apple's QuickTime software, and MacTCP 2.04 or higher (a software program to connect to the Internet). The setup for a PC is similar and detailed in the CU-SeeMe folders described below. Using Fetch, or similar uploading and downloading software, you can download CU-SeeMe software by using these commands: host: cu-seeme.cornell.edu; user ID: anonymous; directory: /pub/cu-seeme (See Figure 2.) Once inside the CU-SeeMe folder, select the most recent version of the software and put the appropriate files on your hard disk. (See Figures 3 and 4.) At this point, you need to plug your camera into your modem or printer port and open up the software. You can go immediately to the reflector test site to interact with other individuals using the software and learn more about how to use the system, or connect to specific colleagues through their Internet protocol or IP address. (Colleagues can get this from their

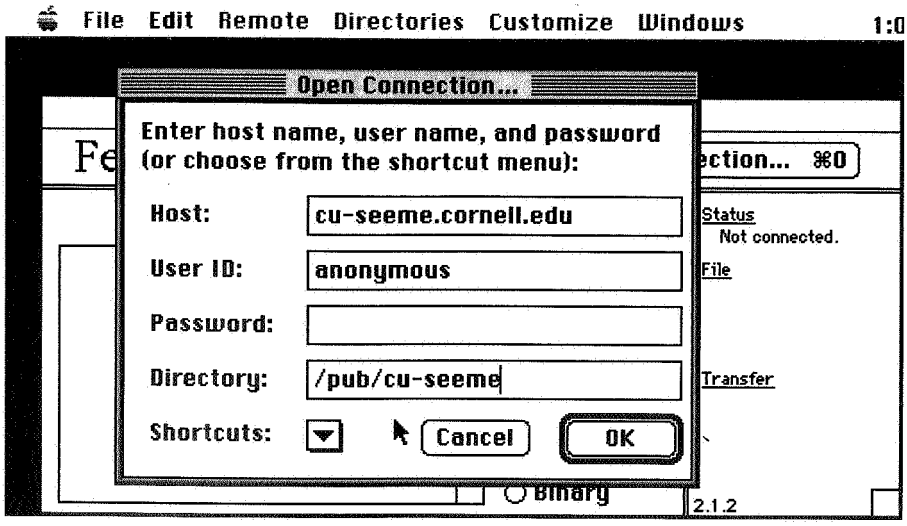

FIGURE 2. *This is the "open connection" window, using Fetch software. It displays the information needed to find the CU-SeeMe software folders.*

systems operator if they do not know it.) From this point on, you are videoconferencing! Figure 5 shows my video conversation with Rich Shavelson, Dean of the School of Education at Stanford University, to demonstrate the one-to-one connection.

The Reality

Videoconferencing over the Internet is an increasingly popular form of online communication. The technology is still developing, however, and several bugs still need to be worked out. The software options are beta versions, still in the testing mode and thus not compatible with every system. Communication is not completely fluid; because of small lags in time, conversational protocols are needed to signal when each person is finished speaking—much as CB radio users do. Such signals can be a simple as "what are your thoughts" or even "over," and are particularly useful during multiple-user videoconferences. One session with seven colleagues resembled a fast video arcade game as I tried to respond quickly to seven simultaneous exchanges.

Another drawback is that videoconferencing is more invasive than simple electronic exchanges. It is easy to forget, as you work on your computer in the privacy of your home or office, that you are on display, often for long periods of time. You learn the hard way to be attentive to any unconscious mannerisms, habits, or behaviors—twirling your hair, stroking your beard, and so on. This level of interaction is not comfortable at all times and for all people.

A problem that needs to be addressed at the software level is the difficulty of connecting Macintosh and DOS-based systems. I have had no difficulty linking machines with the same Macintosh operating systems and software connections to the Internet.[8] Efforts to establish links between different systems have had some problems, however. For example, Leonard Bickman, current president of the American Evaluation Association, and I[9] have been using CU-SeeMe to facilitate association activity. I have a Macintosh; Len has a DOS-based system. During our first attempt at videoconferencing, we were able to see one another immediately. Len could hear me, but I was not able to hear him. He had to use the "chat" window to communicate with me—typing his messages to me in real time, while I spoke to him through my internal microphone.

Another colleague and a co-editor, Abraham Wandersman from the University of South Carolina, had a systems network problem that initially prevented us from communicating—a problem unrelated to the software, the machines, or the camera. We have since worked this out, and I have guest-lectured in his classroom in South Carolina from my office at Stanford, discussing our new book about empowerment evaluation.

Consulting on a one-to-one basis is reasonably straightforward. Workshops or demonstrations for large numbers of people can be engaging and sensitive to individual concerns and interactions—when everything operates correctly. However, such situations present their own challenges. To conduct a workshop, for example, the setup is simple on my end: I have a camera attached to my computer in my office, and my computer is linked to the Internet. My colleagues at the other end of the line need, in addition, an LCD panel connected to the computer and resting on top of a high-intensity overhead projector. This setup projects my larger-than-life image on

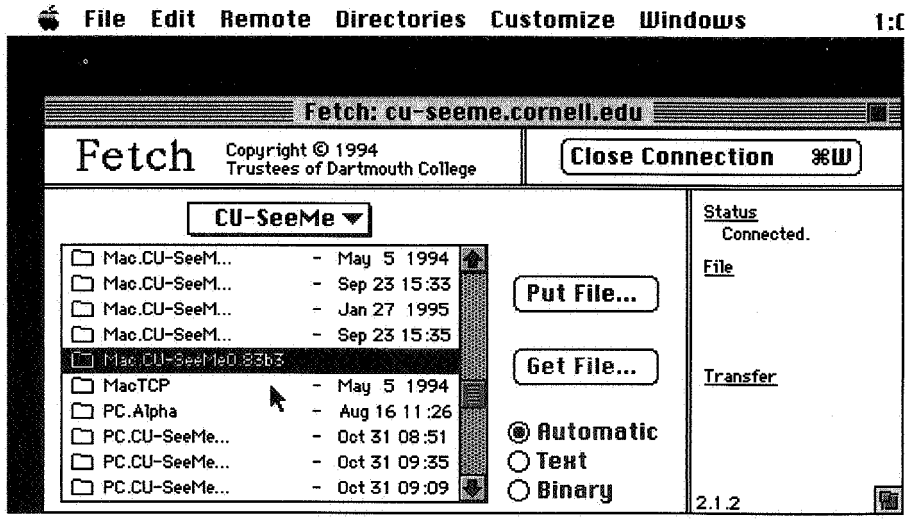

FIGURE 3. *These are the CU-SeeMe folders. A folder containing a recent Macintosh version of the CU-SeeMe software is highlighted in the black bar. Selecting this folder will reveal the individual files needed for downloading to your system.*

the screen, enabling workshop participants to see me clearly. Added connections always increase the potential for problems, however. The computer line can be interrupted or disturbed during the workshop or demonstration, the LCD panel may not be compatible with the group's computer, the room may not be dark enough to see the image, and so on. Any one of these problems can render the videoconferencing exchange worthless. In addition, workshop participants generally must come up to the camera so that I can see and hear them clearly. The potential for disrupting the flow of a workshop is minimized by having a facilitator (and LCD panels) at both ends, but these adaptations require forethought and preparation.

The modem speed and type of Internet line connection are other sources of

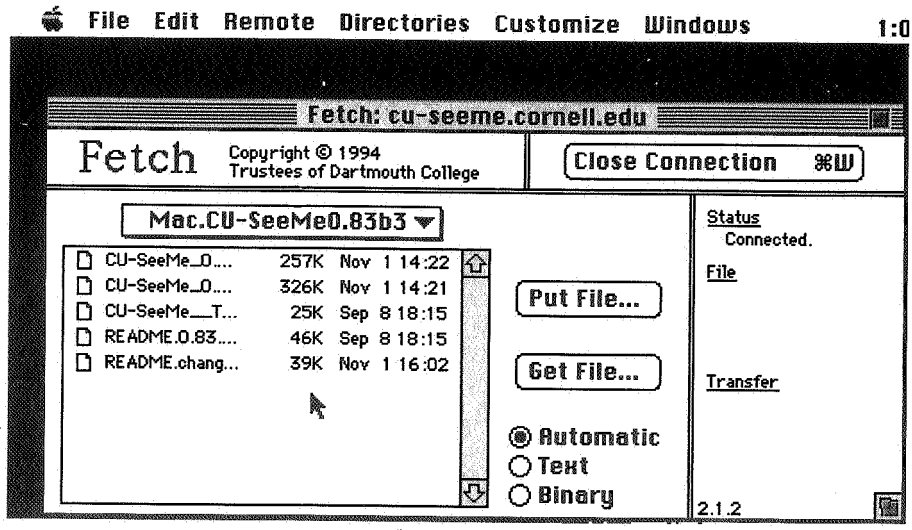

FIGURE 4. *These are individual CU-SeeMe files. Each of these files should be transferred to your system.*

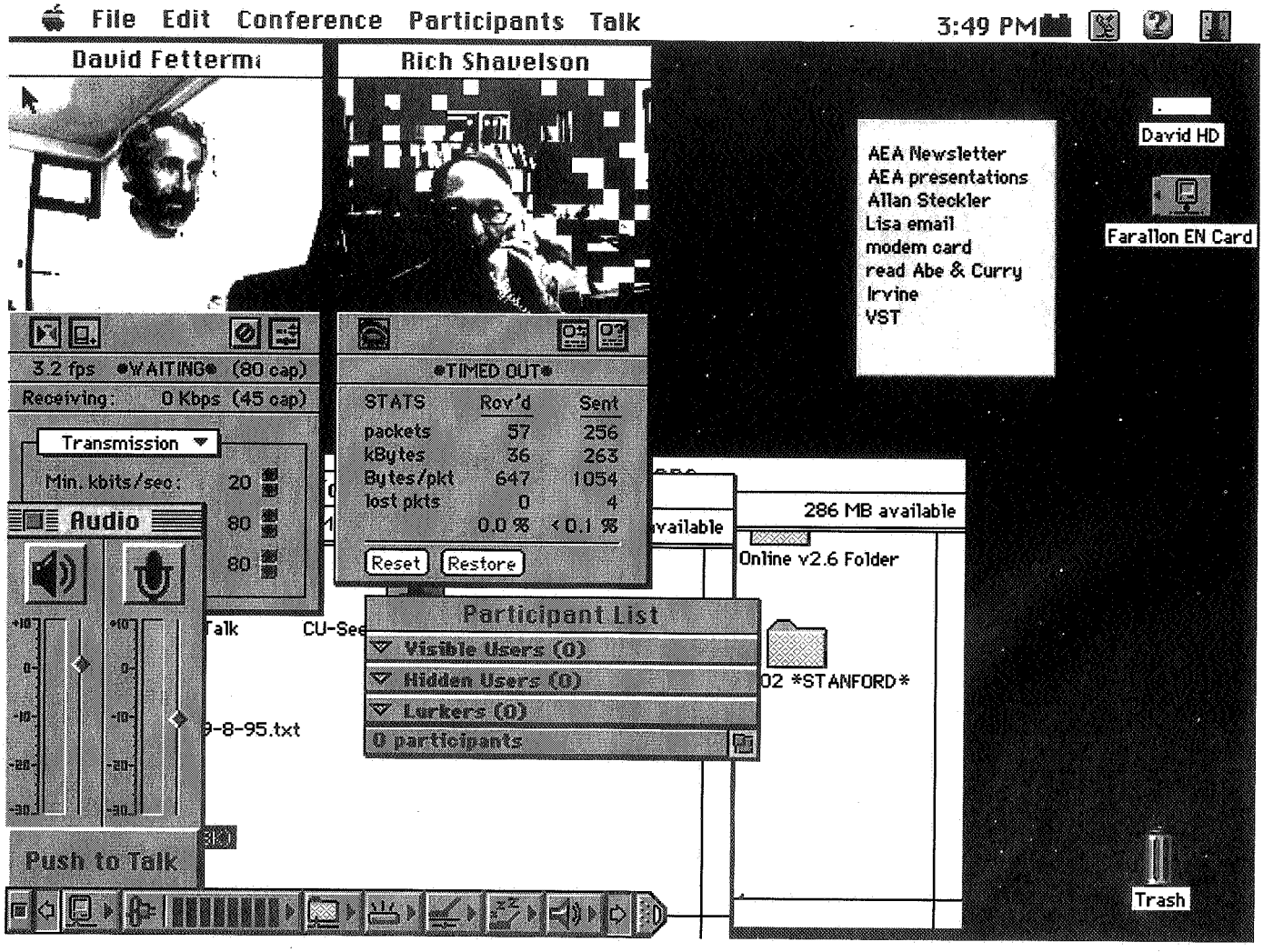

FIGURE 5. *Computer screen snapshot of the author speaking with Rich Shavelson at Stanford. Control boxes below the pictures can be used to modify transmission and reception rates. The open control box below the author's picture can also be used to alter the brightness and contrast of the picture.*

potential difficulties. CU-SeeMe software, for example, requires a 28.8 modem for spoken communications. Internet line connections such as T1, ISDN, or fiber optics are highly recommended for acceptable quality transmissions.

Finally, videoconferencing's greatest value—immediacy—is also its most significant drawback. Asynchronous communication allows people to communicate despite differences in schedule and time zone. Videoconferencing of any sort requires that participants coordinate their schedules. Global videoconferencing thus has limited convenience for participants in widely different time zones.

Internet videoconferencing is a powerful medium, but without a clear connection, it can be as bumpy as the most pothole-riddled sections of the information highway. Its potential is immense, and its capabilities are worth exploring. As with all emerging computer technologies, an awareness that glitches and beta testing are initially the norm and a willingness to work through these difficulties can save much frustration and disappointment.

Conclusion

Internet videoconferencing can enhance electronic exchanges and expand our reach and our accessibility worldwide. As is the case with most developing technologies, glitches remain, although recent breakthroughs in data compression may resolve the most serious problems. Videoconferencing on-line is rapidly coming of age as an additional communication medium—particularly in situations where travel is prohibitive. This new interactional technology can enhance collegial communication and stimulate new applications and avenues of educational exploration.[10]

Notes

[1]Being There, from Intelligence at Large; QuickTime Conferencing, from Apple Computer; and CU-SeeMe, from Cornell University, all work with a QuickCam camera. There is also commercial software available that enables individuals to "call" each other over the Internet (without the video), avoiding long-distance charges. MagicPhone, for example, compresses your digitized voice, sends it across the Internet, and decompresses it at the other end.

[2]See my home page (http://www.stanford.edu/~davidf/ciis.html) for a visual guide of my on-line teaching at the California Institute of Integral Studies. See Fetterman (1989) for details about the subject matter.

[3]For a detailed discussion about empowerment evaluation, see Fetterman, Kaftarian, and Wandersman (1995).

[4]See my home page for additional information about my work in a South African township at http://www.stanford.edu/~davidf/

[5]CU-SeeMe is discussed by the National Academy of Sciences and the National Academy of Engineering (1995).

[6]There are better cameras, including color cameras that require commercial software. However, they cost more and require the purchase of software for each participant.

[7]Sattler (1995) is an invaluable resource to accompany this software.

[8]There are compatibility problems with Open Transport; however, manufacturers are addressing this problem.

[9]I am a past president of the organization and the current co-chair of the Collaborative, Participatory, and Empowerment Topical Interest Group with Jean King. We are hoping to expand our members' communication and interaction within the association using this tool.

[10]I recently attended a videoconference discussion about the emotional quotient using CU-SeeMe software. The videoconference was organized by the Global Schoolhouse/Global SchoolNet Foundation. They provide an excellent example of how this technology is being used to connect elementary and secondary students throughout the world, enabling them to work together on projects of common interest. For additional information about the Global Schoolhouse/Global SchoolNet Foundation, see http://www.gsn.org and, for more information about how they use desktop videoconferencing, see http://www.gsn.org/gsn/cuseeme.schools.info.html

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