Web Surveys to Digital Movies: Technological Tools of the Trade

by David M. Fetterman

The purpose of this discussion is to highlight some of the technological tools of our trade. The irony in sharing information about Web-based tools is that many remain current for about a nanosecond. Bleeding-edge tools and applications are purposely excluded from this discussion. A select set of Internet or Web-based tools that have survived the novelty stage are presented, including Web surveys, digital photography, voice recognition, file sharing, videoconferencing on the Internet, instantaneous chat rooms, and digital movies. Benefits and a few cautions are presented.

Roschelle and Pea (1999) have suggested that a focus on current technology is valuable. In this spirit, American Educational Research Association's 1998 Telecommunications Committee, chaired by Gene Glass, sponsored an *Educational Researcher* article titled, "Webs of Meaning: Computer and Internet Resources for Educational Research and Instruction" (Fetterman, 1998d). It was one of the many vehicles committee members used to assist the membership as members explore and access educational resources on the Internet. It included information concerning search, reference, and directory assistance pages; data collection software, video- and audioconferencing; data sharing and analysis tools; virtual office and file sharing; database programs; and publishing on the Internet.

This discussion will highlight what are rapidly becoming the basic technological tools of educational researchers today. This summary review of technological tools is designed to build on the committee's previous work and continues to share accessible and useful Web tools with colleagues. The specific focus is on data collection related tools including Web surveys, digital photography, voice recognition, file sharing, videoconferencing on the Internet, instantaneous chat rooms, and digital movies.

There are many benefits associated with the use of these tools in research. Information can be collected quickly and inexpensively with Web surveys. The results can be shared with colleagues and stakeholders in nanoseconds, resulting in a more timely review of the data and related publications. Rapport can be maintained with videoconferencing between site visits, when budgets and recent national concerns about safety make travel prohibitive or less appealing. On-line reports can be more compelling with Quicktime video and audio recordings, which have tremendous face validity. Overall, these tools help create webs of meaning (Fetterman, 1998d). They facilitate the development of (virtual) learning communities (Grabe and Grabe, 2000) and build bridges between academics and practitioners. Just as the phone, fax, and Federal Express have made life easier (and faster), these technological tools simply help researchers get their jobs done. We will have the same complaints about these tools as the phone or fax machine when they fail or break down. This is just a measure of how much these tools, like e-mail, have become the technological infrastructure of research today. A review of current tools may also generate new ideas and visions of educational infrastructures in the future.

Web Surveys

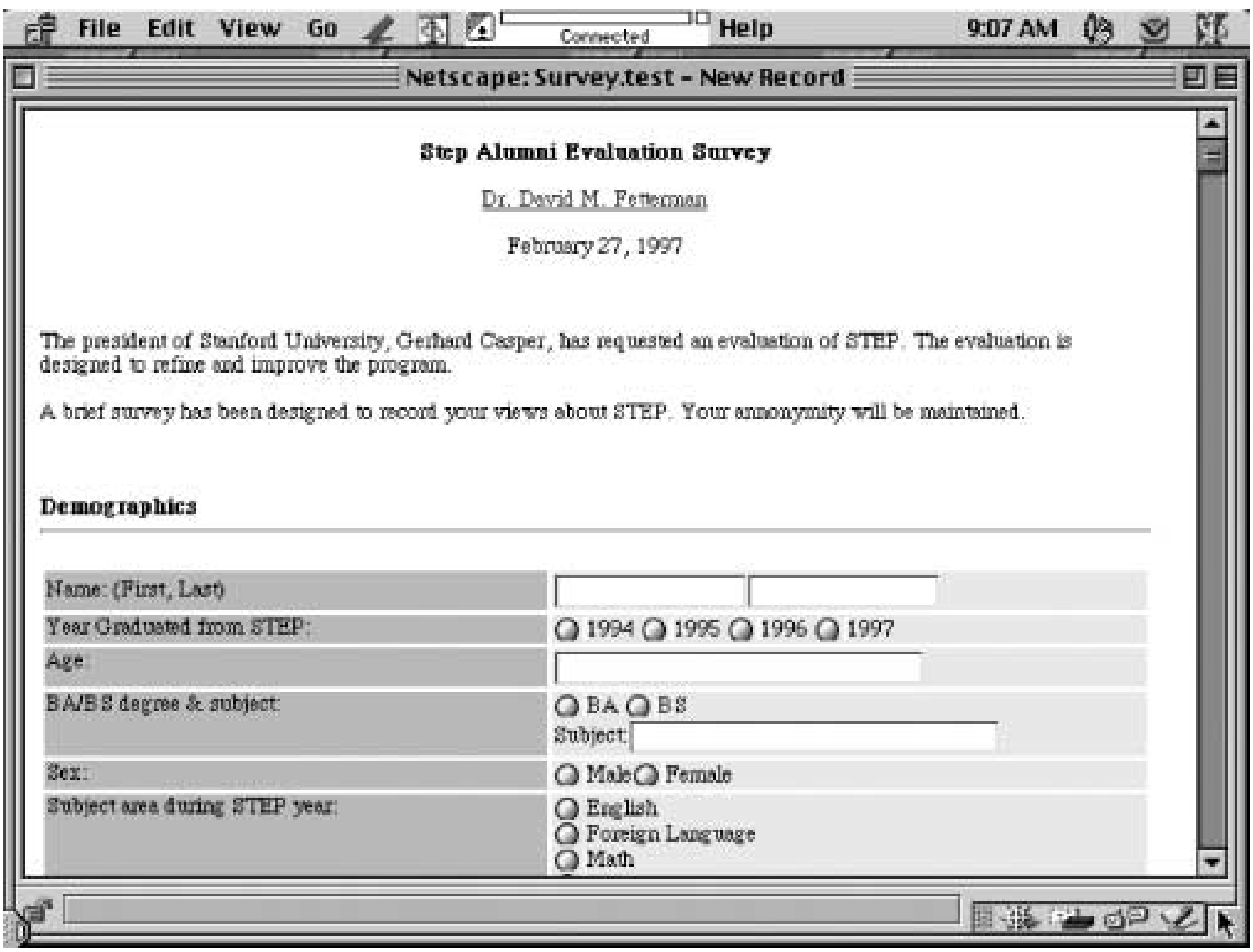
One of the most common data collection strategies employed in educational research involve surveys. In a recent teacher education study,[1] a Web-based survey of teacher education program alumni throughout the country was conducted (see Appendix). Initially, the research team used inexpensive commercial software (FileMaker Pro) to design the survey and place it on the Web. Later Web survey sites were used (Zoomerang, Survey Suite, SurveyMonkey, iNet Survey, and zTelligence). Web survey software is often initially free in its beta version. Later a free limited version is available and the software or Internet company charges for completely enabled software or service. The benefit of these sites was that they provided sample surveys, which were edited to tailor them to the study purpose and population. In addition, they maintained the database, freeing the research team from maintaining it but allowing the team to download the data for manipulation and backup as needed. In either case, there were six immediate benefits to this type of survey work: (a) reduced costs in mailing; (b) reduced cost in data entry, because the moment the survey is completed and submitted it is automatically entered into the database; (c) reduced response time—the response time was as rapid as an e-mail once the survey was posted; (d) a higher response rate was attained by sending out an e-mail reminder to complete the survey; (e) the initial or preliminary findings could be shared with students, alumni, and program decision makers on-line and on an ongoing basis; and (f) the team could immediately sort the responses and look for additional patterns and correlations in the database from any location in the country.

The last benefit was one of the most important. The database could be accessed by the team and manipulated at any time by any team member. This enabled team members to test their hypotheses at any time from the convenience of their own home. It also allowed the principal investigator to monitor data collection and analysis from the office or a hotel room in Washington, DC. Moreover, the Web-based database provided a common core for collaborative, interactive, and generative exchanges. The instantaneous nature of the technology facilitated large-scale data collection, analysis, and reporting within tight time frames. The accessibility of the technology and, as a consequence, the data also served to build a tighter research team or community in the process of conducting the study. In this case, the technology helped create norms and shared values about what we were interpreting, an authentic form of collaboration. This was confirmed in poststudy team meetings, as well as during the study itself.

A feasibility study for an elementary teacher education program at Stanford University also highlights the benefits of on-line surveys. In this example, the research team relied on an on-line survey to determine if there was a "market" for the program. First, we produced and piloted the survey. Then we sent an e-mail to the entire undergraduate population at the University requesting their participation in the study. The e-mail listed the URL for the survey. The majority of responses came in less than 48 hours, confirming that there was a significant interest in enrolling in an elementary teacher education program at Stanford. In addition, the survey data were accessible from remote sites, which facilitated the team's group writing process, enabling us to report the findings to the faculty by the end of the same week. (See Darling-Hammond, Fetterman, Faigenbaum, Eiler, and Lit, 2000 also on the Internet at http://www.stanford.edu/~davidf/elementary.pdf.)

The same processes that we used, with a focus on educational research, are transferable to collaborative learning in the classroom by conducting similar student-based research projects on the Web. (See Fetterman, 1998c; Fetterman, 1996a for examples of teaching hands-on, experiential research in the virtual classroom.)

There are caveats about using on-line surveys, as is true of any on-line tool. Most important, the population will need to have access to a computer and the Internet. Although this was not a problem for the teachers who completed the first survey, it was a consideration. In addition, the server must be carefully monitored to make sure the system is operating as designed. For example, during the pilot run of the Web survey, an evening cleaning person thought the research team left the computer on by mistake and shut it down. This completely disabled the Web database. In addition, precautions are often required to limit ac-



This is a computer screen snapshot of one of the on-line surveys used in the STEP evaluation.

cess to the database. Password protection with a unique user identification and password is the simplest and easiest method to prevent unauthorized access. Firewalls (hardware and software barriers) also prevent unauthorized access to critical data. Precautions are also necessary to protect the identity of respondents, while allowing the researcher to follow-up to improve response rates. (See Shannon, Johnson, Searcy, & Lott, 2001 concerning the perceptions and recommendations of 62 experienced survey researchers from the American Educational Research Association; see also Solomon, 2001 concerning methodological challenges associated with Web-based surveying.)

Digital Photography

Digital cameras are affordable, compact, and provide comparable quality (high resolution) to traditional cameras. In addition, there is no film to purchase or process. The pictures are captured and stored on compact flash cards, disks, or memory cards. The visual impact of a digital picture on a Web page or in a report is, as it has always been, "worth a thousand words." However, digital pictures can be e-mailed and modified more quickly and easily than traditional photography, using for example Adobe Photoshop. In addition, the photographs are available immediately. Digital photographs require the same release forms used by researchers taking traditional photographs in order to present and publish the images. One of our research team members used digital photography as an ice-breaker[2] to gain entry into a group, specifically a comprehensive community initiative[3] meeting focusing on educational improvement. Community members could see themselves immediately and if they did not like the picture it could be erased and reshot moments later. This helped to establish rapport. In addition, the pictures were easily uploaded to a Web page to document the meeting and keep the community and sponsor informed of recent activity. The research team members uploaded some pictures to a secure research team site on the Web to facilitate data sharing among team members. The photographs were maintained on a secure server with password protection enabled to protect students and program participants from unauthorized use of the photographs. This allowed them to document specific observations and share what they were learning with other research team members. They also downloaded the pictures to their computers and sorted them to document patterns of behavior within the community initiative meetings. The pictures were instrumental for various Web-based and hard copy reports, as well as PowerPoint presentations.

Voice Recognition and Transcription

Surveys in each of our projects were informed and followed up by interviews. Transcribing tape-recorded interviews is one of the best ways to become immersed in the data. You hear the content and explore the social construction of the interview data by listening to the intonation, speed, pauses, and silence, which is integral to the analysis. However, the process of recording the content—the initial transcription—can be a laborious endeavor to complete by oneself or expensive, and often inaccurate, when hiring personnel outside the evaluation team. We used voice recognition software successfully for some of our own recorded notes (ViaVoice and Dragon Speak Naturally). We had hoped to record each student and alumni interview and play the tape-recorded interview in front of a computer microphone and let the voice recognition software transcribe our interviews. However, voice recognition has not reached that level of user-friendliness. Voice recognition software must be "trained" to recognize each person's voice with a high degree of accuracy. We would have had to train the software to recognize each interviewee's voice to produce the degree of accuracy required. On occasion, we listened to the interviews using headphones and repeated the interviewee's words into the computer microphone. This is at present a laborious approach. Familiarity with the technology helped us understand what would be useful in the future, even if it could not be done with ease now. The seamless transfer of interview data to database sorts, minus the labor of transcription, is on the horizon. This current obstacle, however, forced us to find a different piece of software to facilitate transcription.

File Sharing and Virtual Office

Data collection, analysis, and reporting stages of any large-scale study require file sharing. As discussed earlier, digital photographs were stored in secured folders on the Web to facilitate team member critique and discussion about classroom observations each day in the teacher education study. It also permitted selected members of the study, including teachers, to analyze the photographs or jpegs.[4] In addition, draft memoranda, preliminary analyses, and reports were initially shared by attaching them to e-mail, specifically to the research team listserv. Team members would use the Track Changes feature of the word processor to make editorial comments and changes in the text. This feature highlighted words added or removed in the original text, which, in turn, allowed the principal investigator to review all comments before accepting or rejecting any changes. This set of procedures greatly sped up the research team report writing process because several rounds of revisions could be completed in a few hours attaching the various drafts to e-mail, while maintaining quality controls for every revision. Preliminary documents, reviewed by the team, were also posted on secured Web pages to facilitate access for program participants and key stakeholders, including master teachers and alumni. Research team members were constant consumers and producers of Web-based information by using inexpensive and user-friendly software such as Claris Home Page and DreamWeaver. Netscape Composer is free home page software that comes with the browser.

The number of electronic files accumulates quickly in a complex 3-year study, such as the teacher education program and the comprehensive community initiative. A central file system was required to organize the massive data sets and to ensure that all of the information was readily accessible to the entire research team. Folders on specific topics were created on the Web, much as they are created on a personal computer. The folders kept topics and comments organized and manageable. Although any system for organizing data is only as good as the person creating the categories or labels and entering the data, electronic folders are superior to conventional paper folders because they are easier to search and easier to share with colleagues throughout the world. Normally, file sharing on a mainframe server is elementary. Files can simply be uploaded and downloaded using file transfer protocol software. Yahoo's eGroups provide a free way of file sharing on the Internet at http://groups.yahoo.com. In addition, iDisk provides a similar file sharing capability at http://itools.mac.com. However, due to the sensitivity of these studies we decided to maintain our own server on a local personal computer. We used my extra PowerBook as a secondary server because it was portable. It allowed me to set up the server in any location in the country while maintaining use of the machine in the field. Special hours were designated each day when the PowerBook (now iBook) would be used exclusively as a server. The portability benefit, however, should be weighted against the security risk of having the laptop stolen or damaged. Researchers should always maintain a backup of their files.

One of the first problems encountered in setting up this virtual office and enabling team members to access the folders involved the cross-platform issue. Some members of the evaluation team used Macintosh and others used Windows computers. The technology specialists informed us that team access across platforms would be an insurmountable obstacle. Technically, they explained how it was not possible for a Windows machine to access files using Macintosh's protocols. However, the team simply viewed this problem as a challenge and because of its collective familiarity with the technology was able to circumvent the problem with a simple hack. Basically, an inexpensive file server program called Hotline was used. This allowed me to transfer files from my home computer to the server. Team members with Macintosh computers were able to use the client software that accompanies the server software. However, Windows users were not able to access the server. Therefore, we made an alias of the server's main file folder and placed it in the Web Sharing folder on the computer's desktop. This allowed Macintosh and Window's users to download any folder placed in the server folder by accessing the personal desktop computer's URL (or Internet Protocol address). The reason for discussing this minor technical point is that it illustrates how the combination of necessity, challenge, and familiarity with the technology resulted in problem solving and learning that transcended the existing technology and had practical implications for the project. In addition, students, and future employees, skilled in troubleshooting will be at a competitive advantage over those who are stymied when things go wrong. (See also DAVE software at http://www.thursby.com and PC MACLAN for Windows at http://www.pcmaclan.com concerning local and wide area network compatibility solutions.)

Videoconferencing

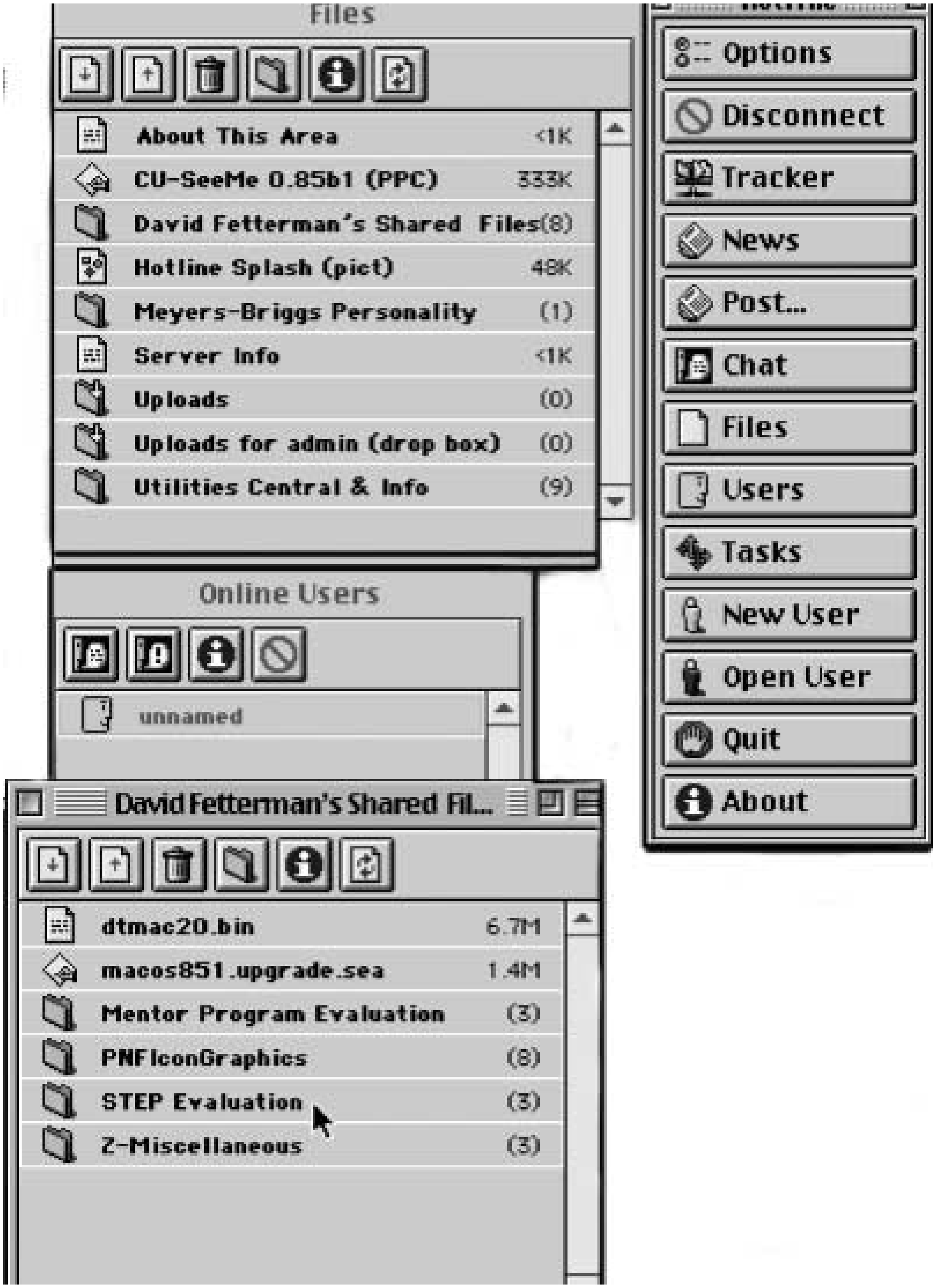
Videoconferencing over the Internet makes communication more personal. It helps maintain both research team and program participant rapport, which has an impact on the quality of data collected. Videoconferencing is superior to teleconferencing because body language can be seen—the facial expressions, hand movements, and many other gestures are lost in a teleconference. The expressions convey meaning. This is parallel to the comparison of content as compared with the intonation or delivery of content in an interview. The latter is needed to investigate the social construction of interview data. In this case, the facial expressions and body language in videoconferencing are needed to investigate the social construction of interview data through videoconferencing. In addition, seeing someone and talking to them helps build and maintain a research relationship. Team members conducting site visits throughout the country have found videoconferencing useful for discussing preliminary findings while in the field. CU-SeeMe and iVisit videoconferencing software are currently[5] free and user-friendly. The software allowed my research team members to see each other while conversing about the day's events. There is no long distance telephone call charge for the communication. The software is simple to use. There is a virtual button on the screen labeled "Push to Talk." One researcher selects the button with the cursor and begins to speak. Then another takes a turn and continues the conversation. Often the telephone connection is poor, making verbal communication difficult or choppy while using this software. Most videoconferencing software has a "chat" window to remedy this problem called an instantaneous chat box (discussed later). It enables each member of the research team to type instantaneous messages or notes to each other, creating a written flow of communication. It is a form of e-mail in real time. (See Fetterman, 1996b, 1998c).

Videoconferencing was invaluable during a collaborative study with middle school science teachers. They had created a nature center with a pond, swamp, and complete ecosystem for various animals. They conducted science experiments routinely. One involved recording the temperature of the pond at various depths over time. They inserted electronic thermometers in the water, which transmitted the temperature readings to a computer every hour. They wanted to share this information with the entire district population and later the world outside the district. They also wanted to show students the actual site in real time, highlighting the relationship between time of day, temperature, depth of water, and environmental conditions such as rain, throughout the day. The research team was interested in the effects of distributed and collaborative learning environments. Our interests converged and together we devised a system to share the information and capture the site in real time. Farallon's free but limited capability Netscape plug-in called Look@Me allows students throughout the district to access this information. Because it was on the Web, it was also accessible to any interested person. A video camera was installed to transmit Nature Area activity in real time over the Internet. EarthCam (http://www.earthcam.com) is one of many similar sites.[6] This extended the community of learners on this middle school science project exponentially and globally. It also allowed the research team to monitor use from their own office, because the system recorded any use of the data or the video camera.

This effort also highlighted how it is necessary to learn about technology to learn effectively with it. This contrasts with the President's Committee of Advisors on Science and Technology *Report to the President on the Use of Technology to Strengthen K-12 Education in the United States* (1997), which emphasized "Focus[ing] on learning *with* technology, not *about* technology" (p. 7). Learning about technology situates subject matter learning within a context that is meaningful for future growth and exploration on the Web. It exposes individuals to the realities of the Web, including promises and pitfalls. (See Pea et al., 1997 and Fetterman, 1998b, "Learning *with* and *about* Technology: A Middle School Nature Area" at http://www.ncsu.edu/meridian/jan98 for additional discussion.)

Instantaneous Chat and Chat Rooms

The most common synchronous communication used in research projects involves



This is a computer screen snapshot of a file sharing software program. The top box includes all the files maintained on the computer or server. The bottom box displays the contents of the shared folder. The shared folder contains files used by the entire research team.

instantaneous chat and chat rooms. Instantaneous chat entails sending a brief message to colleagues that appears on their desktop screen while they are working on another task. Unlike e-mail, you do not have to open up a separate program to read it. You can type a response to the message and maintain a brief conversation in this mode. Research team members frequently sent brief notes to each other to determine if another team member was still awake late at night working on a draft report or to send special alerts during the day after a particularly noteworthy classroom observation or meeting.

For an extended discussion or a discussion with more than one team member our research groups generally opened

This is a computer screen snapshot of videoconferencing over the Internet. The pictures on the left are two individuals talking and seeing each other from different parts of the country. The box on the right lists the virtual room they are conversing in at the time.

private chat rooms. A private chat room allows members of the group to type in questions and ideas, followed immediately by another team member's responses. Many chat rooms are designed to be open to anyone on the Internet interested in the topic being discussed. However, we typically created private chat rooms to maintain confidentiality and minimize interruptions, such as strangers trying to join in our conversation.

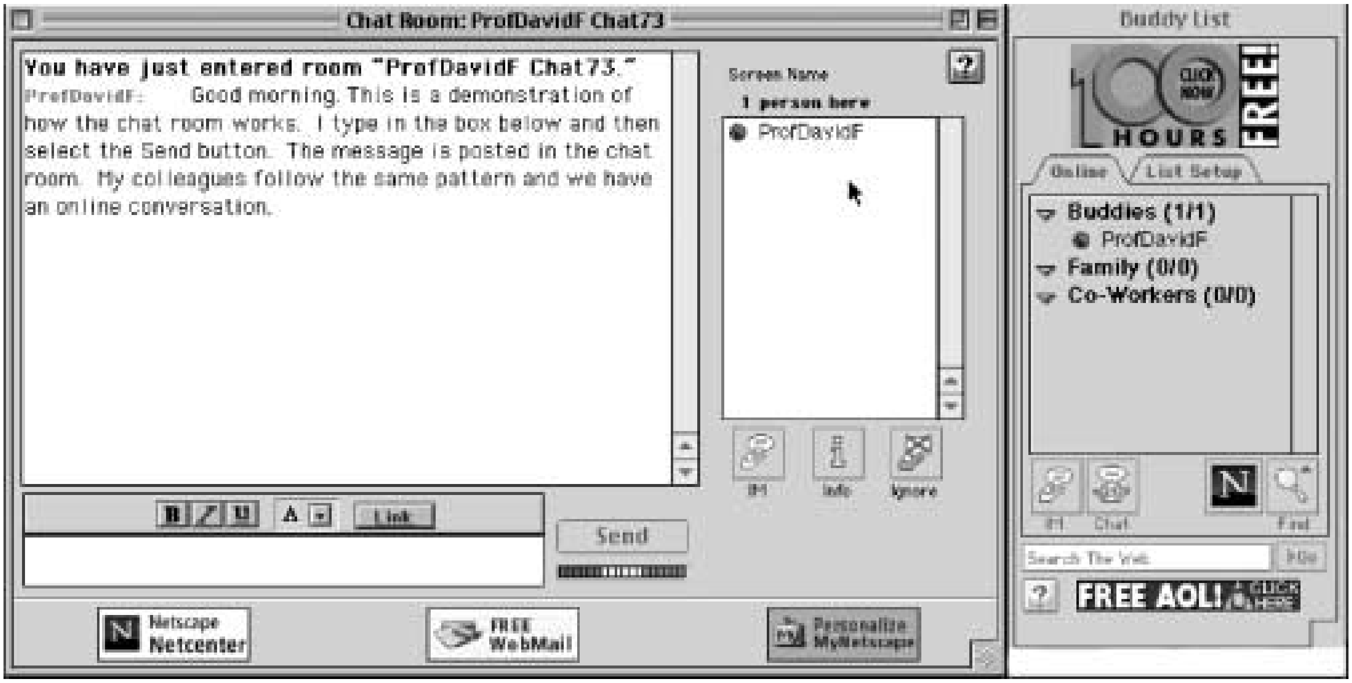
Most chat programs inform the user if a registered colleague or team member is on-line and allows the user to contact them in real time, as long as they are logged on and are using the same free software. Our research teams have used a variety of chat programs throughout our projects to maintain communication. Switching from one to another was necessary when one server or program was not operating appropriately. For example, ICQ (I Seek You) was used routinely because it operated in the background using a minimum of memory and Internet resources. In addition, like most chat software, it automatically alerted all team members when one member was on-line. The web site is http://web.icq.com. We also used Yahoo Messenger at http://messenger.yahoo.com, which now has videoconferencing capacity as well, and Netscape America On-Line Instant Messenger at http://www.newaol.com/aim/netscape/adb00.html.

These private rooms more than any single software used in our projects allowed us to maintain impromptu and routine conversations about our data and plans. It supplemented and reinforced our weekly face-to-face meetings, helping to develop a cohesive and close working team. The software helped us weave threads of conversation, which became the fabric of our research family or community.[7]

David Fetterman and Bryan Osborne are linking the school's Science Nature Area video camera to the Internet as part of a collaborative study with middle school science teachers.

Reporting and Dissemination

Data collection and analysis are greatly facilitated by the Web. However, the Web has equally as important a role in disseminating the findings. Many of our final reports are currently available on the Web. (See Fetterman et al., 1999 at http://www.stanford.edu/~davidf/step.html.) The final reports were available to interested parties throughout the world virtually instantaneously at the same time that the hard copy was published. Teacher education scholars downloaded the teacher



This is a chat room where colleagues engage in a conversation by typing in messages to each other in the bottom box of this virtual room. The conversation is displayed in the top box on the left.

education study within seconds of it being posted on the Web. In this case the reports were posted on the Web using Adobe Acrobat because it retained the original documents' formatting and font. In addition, it was quicker than reformatting the document using html code and then reviewing it for alterations in the presentation of the document. Acrobat Reader[8] is required to read the document, but it is free and readily accessible.

Reports on the Web can include videos, pictures, audio, and extensive graphics. All of these features can enhance the impact of the report, simply by making it more powerful visually and enjoyable to read. Many of our reports received a second proofing using Simpletext, a software program that "reads" the written document. This program also made it accessible to blind and partially blind colleagues who requested it. The electronic thread of communication continued as we received comments through e-mail and a free Internet service called eFax that received the fax from the sender and converted it to a computer-readable e-mail format. This service made it possible to review and respond to faxes concerning the reports while on the road, simply by checking e-mail. This service is available at the following URL: http://www.efax.com.[9] We received traditional U.S. Postal Service mail and telephone calls as well.

Team members have published their findings in refereed journals on-line. *Education Policy Analysis Archives* (http://olam.ed.asu.edu/epaa), *Educational Researcher* (http://aera.net/pubs/er/), and *Practical Assessment, Research and Evaluation* (http://ericae.net/pare/) represent invaluable vehicles for communicating about educational research and evaluation findings. There are many benefits associated with electronically published and disseminated articles. First, drafts can be reviewed more quickly. Drafts can be sent to reviewers as e-mail attachments in formats that make it difficult to modify or copy them (e.g. PDF files). Reviewers can submit their critique on-line, reducing the turnaround time for author revisions. Authors can reach a wider audience since many on-line journals are accessible through the Internet without charge to the user. Authors also benefit from on-line journals because they often have more space. Many use this space to publish some of their raw data, including their interviews. This gives the educational research consumer the opportunity to test the reported findings by playing with the raw data (see Glass, 1997).

One of our books has been distributed over the Web by the publisher, allowing colleagues to download it, minimizing expense, and greatly facilitating the speed of dissemination. Some colleagues and publishers have expressed some concern about copyright issues. Norms are developing in this area, however, and publishing conventions have been successfully applied to this medium for some time (See Burbules and Bruce, 1995). We have not experienced any abuse of privilege in this area. However, we have experienced a rapid and exponentially expanded distribution of ideas. The emphasis on accessibility is increasing. The Public Library of Science initiative (http://www.publiclibraryofscience.org) involves over 30,000 scientists who have signed a petition to boycott any publisher who does not make published research papers available 6 months after publication. (See Pea, 1999 concerning rethinking dissemination in terms of new media communication.)

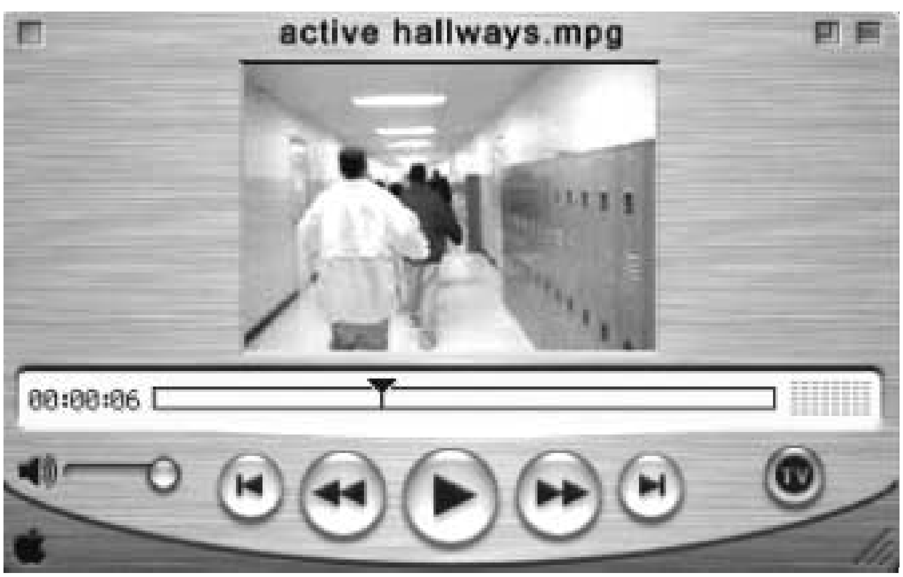
Digital Movies

The written or Web page word is not the only effective medium to disseminate findings. Digital and QuickTime movies are increasingly being used to capture findings in a compelling manner. Our research teams have used digital camcorders to record classroom behavior and then transfer it to a computer through a high-speed (firewire) connection. Software such as iMovie and Quicktime Pro greatly facilitate microanalysis to "unpack" observable social phenomena, including student teachers, who fade into the woodwork instead of actively engaging with students in the classroom. iMovie (inexpensive) and Final Cut Pro (expensive) software enable the researcher to import selected clips from the digital tape, just as a researcher selects representative verbatim quotations or observation notes from the raw data. These clips are placed in a logical sequence to tell the story of a typical classroom, once again just as an author would put the pieces together in a coherent narrative or description. Then the researcher adds a title, transitions between clips, sound and voice overlays as appropriate, and credits. Once again this parallels the editing process in writing. However, in this case the digital film can be used to present a visual draft of a case study, different perspectives about the same observation, and as a tool to examine the elements of the story. In addition, the clip can be exported into various formats such as QuickTime and attached to e-mail for rapid dissemination.

Video clips can also be posted on a Web page to facilitate dissemination. (See http://www.stanford.edu/~davidf for an example of a video on the Internet about empowerment evaluation at the Ministry of Education in Japan.) The same rules apply to using this digital format as using traditional pictures or film in educational research, such as securing written permission from film participants to display the material for educational purposes. In addition, the same methods, precautions, and ethical standards are needed to ensure authenticity and accuracy in digital movie making for research. Fabrications and distortions are no more tolerated in digital movie making than they are in case study or statistical work. However, the ease of sorting the data, organizing it into a coherent story, and sharing it with research team members and globally with other colleagues is qualitatively different than past practices.

Conclusion

The irony in sharing information about current Web-based tools is that they remain current for about a nanosecond and thus the reason why discussions about technological tools or webs of meaning must be revisited. The Web has made time ephemeral, with permeable boundaries. As T.S. Eliot (1943) wrote, "Time present and time past are both perhaps present in time future, and time future contained in time past" (p. 13). However, the tools discussed in this forum have survived the novelty stage. The memory stick or tiny hand held hard drive is new to the field but likely to become an indispensable tool in the future. It is a miniature hard-drive that plugs into a USB port with no additional electrical connection or plug. I recently completed a PowerPoint presentation for the Arkansas Department of Education while on the airplane using my iBook (Mac). I transferred the PowerPoint Presentation to the memory stick (SmartDrive) and then plugged it into the State Department's Windows laptop and presented the PowerPoint presentation using their machine with an LCD projector seamlessly. The report is available in PDF format on the Web at http://www.Stanford.edu/~davidf/arkansas.pdf. All of these tools demonstrate that there is some continuity and consistency in spite of constant change. Many educational researchers depend on these tools to conduct their research on a daily basis. They have incorporated them into their daily practice in spite of the clutter of change all about us. Ironically, high tech tools like CD burners are becoming institutionalized means of fulfilling very traditional functions, such as inexpensively backing up files and distributing findings. In addition, colleagues are mailing CDs to each other containing jpegs, audiofiles, and text. My colleague Dr. Akihiko Hashimoto, from the National Institute for Educational Policy Research, recently sent me copies of digital photographs and audiofiles of my presentations at the Ministry of Education in Japan this year in one compact and inexpensive CD. I hope that this brief exploration into the tools of today will enhance the research lives of colleagues just entering the digital age, supplement the toolbox for more experienced researchers, and stimulate the collective research community's imagination as we begin to conceive of future trajectories and webs of meaning.



This is a computer screen snapshot of a QuickTime picture. A member of the evaluation team attached this digital movie (mpeg) of students in the hallway to document that students were in the hallway during class time. It was later converted into an iMovie and saved as a QuickTime movie to share with other members of the evaluation team. The arrows are used to play the recording just as in a tape recorder or VCR.

Appendix

The Stanford Teacher Education Program Evaluation: Summary Information

Requested by the President of Stanford University

Purpose: To evaluate the quality of the program and help raise the standard of excellence

Study design: First stage was formative to refine and improve the program; second stage was summative providing an overall assessment of the program

Methods: Fieldwork (3 years); surveys; interviews; focus groups; classroom observation; document analysis

Technological tools: Digital photography of student teacher classroom activity; Web surveys of students in the program and their supervisors; evaluation team videoconferencing on the Internet to discuss preliminary findings; qualitative (NUDIST) and quantitative (SPSS and Excel) data analysis software; voice recognition software to assist in transcription; file sharing on the Internet to share data with evaluation team members; e-mail and instantaneous chat with evaluation team members, students, faculty, and colleagues outside the program; PDF versions of report on the Internet; digital movies to reanalyze the data and disseminate selected insights

Informal Peer Reviewers: John Goodlad and Linda Darling-Hammond

Reports available online at http://www.stanford.edu/~davidf/step.html

Articles: Fetterman (2000); Fitzpatrick (2000)

NOTES

[1] This is the Stanford Teacher Education Program Evaluation. See Fetterman (2000), Fitzpatrick (2000), and the published reports at: http://www.stanford.edu/~davidf/step.html

[2] See Fetterman (1998a) and Collier (1967) for a discussion about how cameras can be used as icebreakers—a tool to help gain access and familiarity with people in the field.

[3] This is One East Palo Alto, a $5 million Hewlett Foundation project designed to build capacity and empower citizens. Empowerment evaluation (Fetterman, 2001) approaches have been adopted to facilitate the initiative.

[4] This is the acronym for Joint Photographic Experts Group. It is a technique used to compress graphic files used on the Internet. It is one of the most common tools used to display photographs on the Internet.

[5] Most free software is beta—still in the testing mode. Companies routinely begin charging for their product when they determine it is marketable and reasonably stable. Software companies could begin to charge for this and other software noted in this discussion by the time of publication.

[6] See also Bill's Random Camera (http://www.xmission.com:80/~bill/cgi-bin/camera-list.cgi), Live Cam Pictures World Wide (http://www.wsu.edu:8000/~i9248809/anthrop.html), and WebCam Central (http://www.camcentral.com).

[7] This is responsive to Vector 1: Toward Shared Active Representations and Vector 3: Toward Tools That Foster Self-Improving Communities in Roschelle and Pea, 1999.

[8] Acrobat Reader is free and available at http://www.adobe.com/products/acrobat/readstep.html

[9] Many of the simple Web-based tools described for shared control, mark-up, and annotation transformed potentially passive expressions into ones actively used by learners in formulating, expressing, and critiquing ideas. These tools are also responsive to Vector 1: Toward Shared Active Representations and Vector 3: Toward Tools That Foster Self-Improving Communities in Roschelle and Pea, 1999.

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AUTHOR

DAVID M. FETTERMAN is a consulting professor of education, Stanford University, School of Education, Stanford, CA 94305; davidf@stanford.edu.

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