

**THE ABC's OF INTERNET NEGOTIATION:
U.S. TEACHERS ON THE FRINGES GETTING WIRED**

Mary Virnoche, Humboldt State University

Matthew Lessem, University of Colorado at Boulder

in *Ideologies of the Internet* edited by Katharine Sarikakis and Daya K Thussu. Cresskill: Hampton Press

At 12:45 p.m. on a cool March day, 19 children filed into the computer lab at Mountain View Elementary¹. Seventy percent of the 540 students at Mountain View were from minority and low-income families and most everyone was bilingual. In the lab today was a second grade class of ten girls and nine boys. Almost all the faces were some hue of golden brown and hair was dark. Their speech switched easily from English to Spanish. Kate, their art teacher, happily instructed them to take seats. The noise level in the room boomed as they rushed to their assigned computer stations as if playing a game of musical chairs.

A few children wandered around. They had forgotten where they were supposed to sit. Kate helped them to find a computer. Kate welcomed the students and told them that today they were going to see two dances, listen to a poem about a kite and hear guitar music. She told them to think about the colours and shapes that they would see. With the crayons and paper laid out next to their computers, she said that they should draw those shapes and colours. ... They put on their headphones, clicked and listened. "I can hear it!" A little boy kept time to the guitar music with his pencil on the desk. "Teacher, teacher, help me." "I want to see the dancers on my computer like she has on her computer. Help me get the dancers." "Mira, mira!" (Look, look!) ... (Field Notes: March 1, 2000).

In the above example, we see the unfolding of months of work and considerations as students experience performance art using online streaming audio and video technologies. We have found that bringing students to this point is anything but an easy process for U.S. teachers.

In this chapter we consider Internet technology negotiation and its significance for U.S. teachers who serve

children on the fringes of U.S. society. The chapter draws empirical examples from a case study in the state of Colorado with kindergarten through 12th grade (K-12) teachers involved with the Virtual Chautauqua Projectⁱⁱ. Teacher decisions about technology are negotiated using their own technical identities; ideological messages from colleagues, administrators, parents and students; and structural factors such as administrative policies, teacher preparation time, classroom management, and the technology itself.

For teachers who serve low-income and minority students, this negotiation process is particularly significant. As we discuss below, their classrooms may be the only site for student experience with Internet technologies. While many of the initial access gaps have been closed (Kleiner, Farris, & Green, 2002), we see growing concern over class and racial gaps in how Internet technologies are being used (Hargittai, 2002). To the extent that Internet communications have already become central to civic engagement (Girotti, Friedland, & Sirianni, 2002) and protest (Castells, Yazawa, & Kiselyova, 1995-96), early patterns of technology engagement may very well set the tone for participation in social democracy.

A BIRD'S EYE VIEW: U.S. CHILDREN AND THE DIGITAL DIVIDE

In fall 2001, 99 percent of public schools in the United States had access to the Internet compared with 35 percent of public schools in 1994 when the National Center for Education Statistics made its first estimates (Kleiner et al., 2002). As of 2001, school poverty concentrations and minority student enrollment still affected the extent of access availability: poorer and high minority enrolling schools connected a smaller percentage of their instructional classrooms to the Internet (79-81 % compared to 88-90 %) (Kleiner et al., 2002).

While the Bush Administration belittled the “so called” digital divide and Federal Communications Commission Chairman, Michael Powell, referred to it as the “Mercedes Benz divide,” (Cooper, 2002, p. 1), there is more to the divide than just access to artifacts of varying degrees of advancement. Early on, Internet researchers predicted a widening gap between knowledge consumers and knowledge producers (Calabrese & Borchert, 1996; Virnoche, 1998). These gaps are reproduced because of remaining home access disparities coupled with U.S. public school policies.

Children who have access to home computers have more options for knowledge consumption, production and two-way communication than children whose sole access is through school with policies restricting use. In

2000, 30 percent of children aged 3 to 17 years used the Internet at home (Newburger, 2001). Yet compared with 38 percent of White non-Hispanic children and 35 percent of Asian and Pacific Islander children with home access, Black and Hispanic children were less than half as likely to use the Internet at home, with access rates of 15% and 13% respectively (Newburger, 2001, p. 5).

One of the most pressing concerns for U.S. schools is Internet technology security. Public fear surrounding children's exposure to inappropriate material has been codified through the Children's Internet Protection Act (CIPA). CIPA (Pub. L. No. 106-554) requires schools that wish to qualify for education rate (e-rate) funding to certify that they enforce Internet safety policies that include filtering and blocking programs. Part of school policies may also include restrictions on the use of email and other two-way Internet technologies. In *Online Bonds*, Clark (2000) illustrates that some schools limit online activities to school related research. Online chat and email is not permitted. Kids without home or other outside access may be left with the norm of knowledge consumption.

Knowledge production inequities also appear in web site production. While 84 % of schools with the lowest poverty concentration had school web sites, only 59% of those with the highest poverty concentrations had school web sites. The poorer schools were also less likely to report that students participated in the creation and maintenance of the school web site, and less likely to have students contributing information to the web site (Kleiner et al., 2002, p. 48). With much at stake, U.S. teachers are juggling many factors as they make decisions around integrating Internet technologies into their classrooms. To better understand their technology decisions is to better prepare for closing the digital divide. In the following sections, we consider the Internet technology negotiation of teachers serving largely poor, minority and rural students in Colorado. We use the concept "negotiation" to emphasize the ongoing process of decision making around Internet technology and the changing cultural and organizational environments that provide context for these decisions.

NEGOTIATING THE MATRIX

Technology adoption is an ongoing dialectical process that draws meaning and direction from fluid networks of actors and objects. More recently, power and resistance in adoption have become focal points in diffusion research. Social and cultural environments are considered as well as needs (Peled, Peled, & Alexander,

1994). In his later work, Rogers (1995) noted past “pro-innovative bias ” and “individual blame bias” within technology diffusion models. Morison (1984) suggested that resistance to innovations may stem from efforts to protect a given culture or system and a user’s own identity that is grounded in that environment. At the same time, where organizational and systems communication is complex and inadequate, technology diffusion can be hampered (Ruelle, 1991).

Sherry, Billig, Tavalin and Gibson (2000) also theorized an “Integrated Technology Adoption and Diffusion Model” in which teachers move from learners themselves to adopters, co-learners with students, rejecters or reaffirmers, and finally leaders. We build on the Boulder Valley Internet Project model (Sherry et al., 1997) that considers the technology itself, the user characteristics and perceptions, and the needs of the educational institution within a larger district, local and societal culture regarding Internet technology. Yet, in our approach, these components are framed within a more traditional symbolic interactionist (Blumer, 1969) paradigm. We position the technology not as a separate consideration, but rather as one integrated into the individual lives of teachers and the ideological and structural arenas in which they practice. We found that teachers negotiated technology choices based on a number of factors: their own evolving technical identities; ideological messages from colleagues, administrators, parents and students; and structural factors such as administrative policies, teacher preparation time, and the technology itself.

TEACHERS AND THE TECHNICAL IDENTITY

The early research on technology diffusion characterizes technology users as innovative early adopters, cautious late adopters, and even stubborn non-adopters. However, contemporary theories of identity suggest that individuals' relationships with technology cannot be fully described by this binary continuum. Contemporary theories of identity generally focus on the way individuals negotiate, interpret, reproduce, and produce cultural forms and social structures in their daily lives and activities. Applying these ideas to the realm of technology use yields the concept of a “technical identity” (Darrah, English-Lueck, & Saveri, 1997).

A teacher’s “technical identity” is shaped by her beliefs about herself as a technology user, as well as her perception of the relationship between computer technology and her philosophy of teaching. This identity is emergent and negotiated in the educational context. It is shaped by teachers' past experiences with technology, and it

is expressed and recreated in their on-going use, or non-use, of technology.

Teachers and Technology Skills

Almost all the full-time classroom teachers (14) and one art teacher at Mountain View Elementary used the Virtual Chautauqua web site. Teachers perceived themselves at computer competency levels ranging from resident expert to cautious user.

Mountain View was a gendered work environment not unlike most elementary schools in the United States. Among its 47 teachers and teachers' aides, three were men. While all teachers interviewed were comfortable with at least Web surfing and email, almost all agreed that one male teacher was the most outstanding formal and informal technology resource.

The Experts: When Mountain View Elementary teachers talked about technical support resources, they were usually referring to either a male faculty member, spouse or district technical support person. Two faculty members identified themselves as more knowledgeable than the rest of the faculty. Yet these two faculty members had different approaches to their status as expert users.

Juan was a thirty-something male Hispanic second grade teacher. He sought out technical training and participated in a statewide program to become a technology coach for other teachers. Almost all the teachers interviewed identified Juan as a key technical resource, and he confirmed his role as the in-house "computer guy."

Because of his level of technical involvement and expertise, Juan's students received far greater exposure to the technology. He involved students in offline knowledge production using online content. For example, Juan's students not only surfed Virtual Chautauqua musical clips, but they also scored the clips and created a class tally that illustrated which piece had been the most popular.

Unlike Juan, Lori, a white woman, had confidence in her own use of technology but did not think of herself as an expert. Both Lori and Juan were very good at using Mountain View's technological resources, but they conceived of their expertise in very different ways. Juan embraced his role as a source of support for other teachers. Lori reported that other teachers often came to her for help, but she distanced herself from this support role. Other research (Virnoche, 2001) has found that male organizational members in the female-dominated human services sector gravitate both formally and informally into the technical expert role.

Though technical identities were clearly gendered, Juan's identity as a Spanish-speaking Hispanic teacher breaks the frame of technology expert as "other." The significance of this break and others like it must not be underestimated as the digital divide still lines up by ethnicity and puts Hispanics and Blacks at the disadvantage. In addition, even Lori's reluctant expert identity was significant as identities are always in process, and alternative role models for technologists are always in need. Shortly after we left Mountain View, Juan also left the school. We were told that Lori agreed to go through training and assume the formal in-house technology coach role.

The Competents: The other teachers that we observed and interviewed were competent with basic Internet skills and were easily able to learn new computer-related skills. Most of the teachers had little or no formal training outside a few district-sponsored sessions and a recent class taught by Juan.

Despite this general competence among the teachers, there were marked differences in how comfortable individuals were when using the computers and the Internet. Teachers who were more comfortable using the technology had often used computers and the Internet in a variety of situations: to plan a vacation, to research materials for class, to communicate with family members. These teachers did not possess significantly different technical skills or knowledge than the other teachers, but they did exhibit greater interest and trust that the technology could be a useful part of their teaching.

The individual's comfort level with technology emerged as particularly important as teachers attempted to predict their ability to use the lab while juggling class management needs. As Lori noted: "You're not going to do something you're uncomfortable with - with your whole class. It'll totally be a mess."

To alleviate their discomfort and improve their competence, teachers often employed cooperative learning strategies. At an early Virtual Chautauqua training, teachers trickled into the lab, expressed enthusiasm about the chance to work together on computing, and quickly engaged in an informal co-learning mode of sharing web resources and strategies for surfing. Many of these same teachers had individually expressed reservations about the training. Yet collectively they were confident. Collective confidence or "safety in numbers" has also been documented in other research that has addressed technology training and gender (Virnoche, 2001). Other research has pointed to cooperative learning as a mechanism for addressing structural inequities for women and minorities in science, math and engineering (Seymour & Hewitt, 1997). Incongruencies between computing skill levels and self-

conception can be mitigated by structured co-learning opportunities.

Teaching Philosophy and Computing Technology

Teachers situate Internet and computing technology within a philosophy of teaching. They construct a social meaning for these technologies aligned with their understanding of student needs. While Spielberg and Starr (1994) described a tension between user anxiety and curiosity in the adoption process, we saw more nuanced considerations linked to teacher and student social locations. Almost all the teachers were enthusiastic about Internet resources and felt a responsibility to provide their students with classroom computing.

Technology as Portal: The teachers at Mountain View described the Internet as a portal to information and opportunities beyond what most teachers could offer through traditional textbooks and supplemental classroom instructional aides. They felt that the Internet could be especially helpful for finding resources more relevant to students from minority communities, and some used the Internet to locate Spanish-language materials.

Mountain View teachers tried to make learning meaningful for students whose ethnic and social class experiences were not regularly reflected in mainstream media and texts. They became excited about using Virtual Chautauqua when online resources provided multicultural perspectives that enriched the entire curriculum. These strong philosophical teaching orientations in many ways helped teachers overcome other hesitations about using the technology with their students.

Value in Computers: Paula, a confident white teacher, said that only 4 out of her 40 kindergarteners had computers at home. She and others felt a strong responsibility to expose even these young children to computer technology so they would not be left behind in the upper grades. The idea that students who otherwise had no access to computers needed as much time as possible in the lab existed in tension with many teachers' idea that "technology for technology's sake" was not good enough. This tension left many teachers constantly searching for meaningful and appropriate computer activities.

Others have unveiled the class and social network dimensions of technology consumption (Douglas & Isherwood, 1979; Virnoche & Marx, 1997), suggested that technology is a social locating device with multiple layers of meaning central to understanding its adoption (Ling, 1999; Silverstone, 1994), and focused on the gender embedded in the structures surrounding, and meaning of, information technologies (Virnoche, 2001; Zoonen, 1992).

Within a long tradition of considering the democratizing potential of information technologies (Mumford, 1964; Sclove, 1995), others have suggested that Internet technology may be a significant factor in diminishing power inequities (Castells et al., 1995-96; Mele, 1999; Rogers, Collins-Jarvis, & Schmitz, 1994).

A teacher's technical identity is a critical factor in how quickly and to what extent she will use new technology on her own and with students. Those with fewer skills but greater self-confidence were more likely to learn on their own and "risk" using technology with students. Those who found confidence in co-learning environments often translated that confidence into their own classrooms. All who understood digital literacy as a building or stumbling block for their students, and a window to culturally relevant resources, felt a responsibility to get comfortable using technology in their teaching. Still, their teaching philosophies and professionalism tempered their desire to use technology that was as yet not clearly integrated with their curricular goals.

NEGOTIATING THE TECHNOLOGY MESSAGES

President Clinton, in the early 1990s, called for the wiring of all primary and secondary schools. Millions of dollars were channelled into funding the Telecommunications Act of 1996 and its provisions for educational rates (e-rates) to assist schools with funding connectivity. Closer to home, district administrators, parents, fellow-teachers, principals, family members, and kids all contribute to the discussion on Internet technologies. The teachers we worked with felt that the messages overwhelmingly supported Internet use in the schools. As has been noted in other technology diffusion research, these affirmative messages create an overall culture that is important to Internet technology use (Peled et al., 1994). Yet observations and interviews illustrated that caution and even fear were still part of the discourse.

The Push Towards Technology: Messages from Above

All the teachers interviewed at Mountain View Elementary agreed that "the district" encouraged technology integration. District messages were embedded in mass email messages, technology training, and the allocation of financial resources to state-of-the-art computing equipment and Internet connectivity. At Mountain View particularly, an energetic principal encouraged and required her teachers to make use of the newly available technological resources. The passage of a large bond issue funding new technology in the district added community support to the administration's pro-technology stance.

Teachers also got messages from parents concerning their children's computer usage. Parents who could not provide their kids with computers at home were particularly concerned that their children got enough time just working on the computers. More computer literate parents brought in suggestions for software, asked specific questions about the types of activity the children did on the computers, and requested to have email communication with their children's teacher. This parental interest in technology use further reinforced the message that teachers needed to become proficient with technology and use it in their teaching.

These examples also illustrate the developing divide around Internet use patterns: knowledge production versus knowledge consumption. Teachers at Mountain View articulated an ethic of "no computers for computers' sake," but a strong push from lower-income parents just to get the kids in front of the computers, as well as the pro-technology messages from the school district and voters, tempered this attitude. It is easier to value "computer time" over more clearly defined curricular goals when you know that you are meeting parental and administrative wishes.

The Pull Towards Technology: Little Hands Lead the Way

As much as teachers felt compelled to use computers and technology by their co-workers and superiors, they were equally pulled into technology use from within their classrooms. Their own students delivered perhaps the loudest messages evidenced in the eyes, words and jumping tactics of elementary-age children.

Yolanda was a second grade teacher whose first language was Spanish. Though she had been using computers with her students for some time, she was hesitant about using the Internet and Virtual Chautauqua. It was her students' reaction that brought her across the river of uncertainty:

They were waiting for Tuesday. They say "Oh, computer day! What do we have to do today?"

And we had to listen to music from Africa.... I mean that was amazing because the kids were alive.

During free time teachers reported that computer slots always filled first. Teachers did not hold "computer free time" to the same high curricular standards as more organized computing time. This bracketing of certain computer time helped teachers mitigate internal philosophical conflicts concerning student Internet and computer use.

Flashing Yellow Lights: Approaching the Internet with Caution

Despite the overwhelming push for technology integration, teachers also saw reasons for caution. Permission slips and student fears tempered teacher enthusiasm. Permission slips communicated a “potential danger” akin to loading a bus with children for a trip to the zoo. Teachers thought that while parental uncertainty about the Internet kept some from signing slips, others with particular religious affiliations were very certain they did not want their children online.

Teachers also faced the reactions of their own students. For some students who had not been around computers, the technology was daunting. Juan observed: “I have some children that have just moved from Mexico and they do not feel comfortable with these machines that are so visual and so interactive.” Yolanda also was sensitive to the overwhelming feeling that some small children have with the technology:

In the beginning they were so scared.... Everything is new. They don't even know how to touch the letters.

Teachers working in low-income, minority and immigrant schools need to be particularly sensitive to these issues. Already feeling isolated from peers and the institutions themselves, marginalized students may suffer additional anxiety when faced with uncertainties around Internet technologies.

STRUCTURAL CONSIDERATIONS IN TECHNOLOGY NEGOTIATION

Earlier research on Internet technology in schools focused heavily on technology factors such as usability and access (Levin, 1995; Wolf & Black, 1993). Given the sparse availability of Internet access and the less friendly early interfaces, one can understand why these issues were central. In addition, other organizational factors central to adoption included scheduling or time (Farquhar & Surry, 1994), training and technical support (Hoffman, 1996; Sherry, Lawyer-Brook & Black, 1997).

Sherry et al. (1997) suggested that the adoption and diffusion process has been theorized in three ways: as a social process (the Rogers model), as a cultural process (Peled), and as a systems process (Ruelle and Morison). These overlap, since systems are cultures, and cultures have social processes. Within the system there are barriers to diffusion. Some of these are sociocultural, such as the individual characteristics of the end users; others are involved with maintaining the stability of the system as it presently exists. Moreover, the system itself imposes constraints on

the adoption and diffusion process. To be successful, a new technological innovation requires a worthy environment that can support it; resources to install, implement, and maintain it; readily available, two-way communications channels; and an overall administrative vision that is clearly communicated to all members and key stakeholders.

In our research, teachers navigating a path to or away from Internet use in their classrooms were still facing usability and access issues, as well as administrative practices, everyday classroom management issues, and technology training barriers. Resource issues were also at hand.

Technological Factors and the Maze of Access

In 1999 Colorado schools had an average ratio of 13 students to one Internet computer. While this sounds like a promising access statistic, teachers know that the numbers hide a wide range of technological encounters. While searching for access at one school, we encountered full labs, disconnected workstations, computers with connectivity but no sound, and a library computer too old to run the RealAudio software needed for Virtual Chautauqua. The teacher resigned herself to working on Virtual Chautauqua lessons at home.

Even with new and fully functional computers available, teachers experienced technology struggles contextualized within a larger matrix of school technology and support. Teachers at Mountain View used words like “fast” and “easy to use” to describe the new computer lab. Still, programs froze. Workstations were always “out of order.” Audio and video files often loaded slowly because of the shared load on the T1 connectivity. Teachers struggled with software compatibility issues as they tried to open computer files on old classroom computers.

Another issue that hampered teachers’ use of the technology was a lack of appropriate software and Internet content. Most teachers stuck with a few pieces of software made available by the school district. Teachers complained of a lack of software for basic English and Spanish literacy, as well as a lack of time to explore available software from the district. They liked Virtual Chautauqua because they could fairly easily create their own bilingual Internet content and locate, limit, and easily present relevant artistic content.

Administrative Control:

Technology and Red Tape

Teachers encountered a layer of administrative factors that complicated the process of using technology at

school. Teachers dealt with legal issues, scheduling of computer time, security measures, and finding technical assistance.

Legal Issues: Teachers faced liability and logistical concerns due to the legal issues surrounding student use of Internet resources. The control measure was the permission slip. Yet when students were not given parental permission to use the Internet, teachers were then faced with logistical dilemmas of separating Internet users from non-users.

Scheduling: Other research has documented that Internet technology had the greatest impact on teaching and learning when classrooms had direct access to the Internet (Sherry et al., 1997). In our research, we saw the importance of this access and also mechanisms that teachers used to compensate for inadequate access.

Kate was a young white part-time art teacher at Mountain View who also worked with yearbook production at a nearby middle school. She said that she sometimes had to “talk other teachers into having their time” to accomplish what she needed to with her students in the lab. While labs are a common structural response to Internet access needs, they create their own barriers. Separate labs require greater planning on the part of teachers and limit spontaneity.

Security: Security measures, from locked doors to system passwords and server firewalls, protected the costly investments in technology. Yet these same measures sometimes made it difficult for teachers to accomplish their goals. For example, one teacher wanted to view her students’ computer screens from the teacher station, yet she was told that this feature was disabled in order to prevent teachers from disrupting the system. Teachers comfortable with computing technologies were particularly frustrated with these limits.

Technical Assistance: Finally, all the teachers quite frequently needed some type of technical assistance. This process was as much an administrative issue as a technical one. Technical support varied from school to school. In some cases, there was a technical support person in the building. At Mountain View, the teachers’ primary level of assistance was from colleagues. When informal networks of colleague support failed to meet teacher needs, the teachers placed formal requests through the school secretary to a district-level technical assistant who came once a week. Short of the presence of a dedicated in-building support person, any substantial technical glitch usually meant that a teacher abandoned the technology-related task at hand.

The Everyday Life of the Teacher:

From Preparation Time to Classroom Management

The everyday life of classroom teachers affects classroom use of the Internet. Two key issues include time constraints and classroom management.

Technology and Time: Teachers face many time constraints. They have short periods in which to teach a given topic and little time allowed for preparation. They are always being asked to incorporate new and more material. At the same time, they are limited in curricular freedom by state education standards and achievement testing.

Teachers explained that participating in training required time from their personal lives. Participation often required childcare negotiations and reshuffling of demands on their personal time. To allow greater participation in the project, Virtual Chautauqua provided substitute teachers who took over teachers' classroom duties while they attended training sessions.

Computing and Control: Classroom management is a central issue facing K-12 teachers. Teachers often find themselves alone and facing large numbers of students with many readiness-to-learn and skill differences. Other research has found that the Internet's open framework created a loss of control that was difficult for many teachers (Sherry et al., 1997). In addition, student expertise sometimes created a novice/expert role reversal that compromised a teacher's sense of control.

In our research, we did not find teachers concerned about potential role reversals, yet the extent to which a teacher believed the Internet would exacerbate or ease general classroom control did affect her propensity to adopt it for classroom use. The bilingual component of Mountain View added another layer of control complexity. Some teachers felt that giving computing directions in two languages while trying to manage up to 30 first or second graders was more than they could handle.

WIRING ON THE FRINGES

In this chapter we discussed the process of Internet negotiation among a group of K-12 teachers in the state of Colorado. Our research supported much earlier work that points to several key factors in teacher technology negotiation: a technical identity, the larger culture around technology, and structural factors including technology

itself, administrative policy and constraints and opportunities in “everyday teaching.” We also confirmed gendered patterns in responsibilities and comfort related to computing and Internet technologies. Yet perhaps due to a largely female teaching pool and the many factors pulling them to use the Internet, we found women teachers taking on technology leadership roles and a generally wide interest in Internet use.

Because most of the students at Mountain View Elementary were from low-income ethnic minority families, our work found additional factors that weigh into teacher decisions. Most of the teachers and the principal at Mountain View felt a special responsibility to provide access to computing and Internet technologies. Theirs were the students about whom the Bush Administration spoke when it declared the digital divide closed through school access.

It is to the teachers’ own credit that they shared a belief that technology for technology’s sake was not a good reason to have computers in their classrooms. Yet teachers on the fringes face a particularly troubling negotiation in this area. Knowing their students had no other access, and hearing pleas of low-income parents, teachers struggled between spending valuable preparation time developing meaningful Internet lessons versus just letting students have time online for access sake alone. To deal with this tension, many teachers explicitly “bracketed” students’ computing time into free use time and structured time with clearly defined goals.

The Internet with its quick access to Spanish and other language materials covering current events and other subjects was particularly attractive to teachers in the bilingual setting. Yet at the same time, finding appropriate materials took time. Letting students surf for their own materials meant teachers had to give up controls. This, coupled with large classroom sizes and other control and directing issues in a bilingual classroom, was too daunting for many teachers.

It is clear that even the poorest of U.S. communities have received the message that Internet technology access and consumption are important. Yet the more nuanced message concerning knowledge consumption versus knowledge production has been less clearly articulated. In an era where power and information production and control are tightly coupled, it is essential that teachers, parents, policy makers, and students themselves do not become complacent with merely plugging into the network. Particularly in schools serving low income and minority groups, digital literacy goals must ultimately be as much about participating in online conversations as they are

about access to the conversations of others.

REFERENCES

- Blumer, H. (1969). *Symbolic interaction: Perspective and method*. Englewood Cliffs, NJ: Prentice-Hall.
- Calabrese, A., & Borchert, M. (1996). Prospects for electronic democracy in the United States: Rethinking communication and social policy. *Media, Culture & Society*, 18, 249-268.
- Castells, M., Yazawa, S., & Kiselyova, E. (1995-96). Insurgents against the global order: A comparative analysis of the Zapatistas in Mexico, the American Militia and Japan's AUM Shinrikyo. *Berkeley Journal of Sociology*, 40, 21-59.
- Clark, L. S. (2000). *Online bonds and offline boundaries: Teens and discussions of difference*. Paper presented at the Cyberculture and Diversity Conference, University of Maryland.
- Cooper, M. N. (2002). *Does the digital divide still exist? Bush Administration shrugs, but evidence says "yes"*. Consumer Federation of America. Retrieved May 28, 2003, from <http://www.consumerfed.org/DigitalDivideReport20020530.pdf>
- Darrah, C. N., English-Lueck, J. A., & Saveri, A. (1997). The Infomated Households Project. *Practicing Anthropology*, 19(4), 18-22.
- Douglas, M., & Isherwood, B. (1979). *The world of goods: Towards an anthropology of consumption of goods*. London: Routledge.
- Education Week. (1999). Technology Counts '99. Retrieved February 27, 2003, from <http://www.edweek.org/sreports/tc99/>
- Farquhar, J. D., & Surry, D. W. (1994). Adoption analysis: An additional tool for instructional developers. *Education and Training Technology International*, 31(1), 19-25.
- Girrotti, J., Friedland, L.-A., & Sirianni, C. (2002). *Youth civic engagement in communication: An emergent movement?* Paper presented at the Society for the Study of Social Problems, Chicago, IL.
- Hargittai, E. (2002). Second-level digital divide: Differences in people's online skills. *First Monday*, 7(4). Retrieved May 27, 2003, from http://www.firstmonday.dk/issues/issue7_4/hargittai/index.html
- Hoffman, R. (1996). *School technology integration: An automated needs assessment and planning tool*. *Technology and Teacher Education Annual*, 1996. Paper presented at the Society for Information Technology and Teacher Education [SITE], Charlottesville, VA.
- Kleiner, A., Farris, E., & Green, B. (2002). *Internet access in U.S. public schools and classrooms: 1994-2001 (NCES 2002-018)*. National Center for Education Statistics (NCES). Retrieved May 23, 2003, from <http://nces.ed.gov/pubs2002/internet/> NCES 2002018
- Levin, S. (1995). Teachers using technology: Barriers and breakthroughs. *International Journal of Educational Telecommunications*, 1(1), 53-70.
- Ling, R. (1999). *A short note on the use of mobile telephony in the 'hyper-coordination' of teen activities*. Kjeller, Norway: Telenor.
- Mele, C. (1999). Cyberspace and disadvantaged communities: The Internet as a tool for collective action. In M. A. Smith & P. Kollock (Eds.), *Communities in cyberspace* (pp. 290-310). New York: Routledge.
- Morison, E. (1984). Gunfire at sea: Conflict over a new technology. In R. Westrum & K. Samaha (Eds.), *Complex organizations: growth, struggle, and change*. Englewood Cliffs, NJ: Prentice-Hall.
- Mumford, L. (1964). Authoritarian and democratic technics. *Technology and Culture*, 5, 1-8.
- Newburger, E. C. (2001). *Home computers and Internet use in the United States: August 2000 (P23 207)*. U.S. Census Bureau, Current Population Reports. Retrieved May 26, 2003, from <http://landview.census.gov/prod/2001pubs/p23-207.pdf>
- Peled, Z., Peled, E., & Alexander, G. (1994). An ecological approach for information technology intervention, evaluation, and software adoption policies. In E. L. Baker & H. F. O Neil Jr. (Eds.), *Technology assessment in education and training*. Hillsdale, NJ: Erlbaum.
- Rogers, E. (1995). *Diffusion of innovations* (4th ed.). New York: The Free Press.
- Rogers, E. M., Collins-Jarvis, L., & Schmitz, J. (1994). The PEN Project in Santa Monica: Interactive communication, equality, and political action. *Journal of the American Society for Information Science*, 45(6), 401-410.

- Ruelle, D. (1991). *Chance and chaos*. Princeton, NJ: Princeton University Press.
- Sclove, R. E. (1995). *Democracy and technology*. New York: Guilford Press.
- Seymour, E., & Hewitt, N. M. (1997). *Talking About leaving: Why undergraduates leave the sciences*. Boulder, CO: Westview Press.
- Sherry, L., Billig, S., Tavalin, F., & Gibson, D. (2000, May). New insights on technology adoption in schools. *THE Journal*. Retrieved June 1, 2003, from <http://www.thejournal.com/magazine/vault/A2640.cfm>
- Sherry, L., Lawyer-Brook, D., & Black, L. (1997). *Evaluation of the Boulder Valley Internet Project: A theory-based approach to evaluation design*. Denver: RMC Research Corporation.
- Silverstone, R. (1994). *Television and everyday life*. London: Routledge.
- Spielberger, C. D., & Starr, L. M. (1994). Curiosity and exploratory behavior. In H. F. O'Neil & M. Drillings (Eds.), *Motivation: Theory and research*. Hillsdale, NJ: Erlbaum.
- Virnoche, M. E. (1998). The seamless Web and communications equity: The shaping of a community network. *Science, Technology, & Human Values*, 23(2), 199-220.
- Virnoche, M. E. (2001). Pink collars on the Internet: Roadblocks on the Information Superhighway. *Women's Studies Quarterly*, 3&4, 80-102.
- Virnoche, M. E., & Marx, G. T. (1997). 'Only Connect': E.M. Forster in an age of electronic communication: Computer-mediated association and community networks. *Sociological Inquiry*, 67, 635-650.
- Wolf, K., & Black, L. (1993). *The Boulder Valley Internet Project first annual progress report: 1992-1993*. Boulder: Boulder Valley School District.
- Zoonen, L. van. (1992). Feminist theory and information technology. *Media, Culture and Society*, 14, 9-30.

ENDNOTES

-
- ⁱ Mountain View Elementary was a Virtual Chautauqua pilot site. All but three of its 47 teachers were women. Of the 18 full-time kindergarten through 2nd grade teachers who were the main focus of the outreach, three identified as Hispanic, the rest as white. One classroom teacher was male.
- ⁱⁱ Virtual Chautauqua was an outreach grant project of the University of Colorado at Boulder funded in part by a grant from the U.S. Department of Commerce's National Telecommunications and Information Administration (NTIA) Technology Opportunities Program (TOP) and matching grants from 14 Colorado arts, education, and media organizations. The mission of Virtual Chautauqua was to bring performing arts to low-income and rural K-12 students via streaming audio and video Internet technologies (<http://virtualchautauqua.org>). Between 1999 and 2000 we collected data from approximately 100 Colorado K-12 teachers and student observations.