

New Immigrant and Low-Income Parent and Student Voices on Technology

Davina Pruitt-Mentle
University of Maryland, U.S.A.
dp151@umail.umd.edu

Abstract: Results and educational implications from this research project exploring new immigrants and low-income parents and students voices on the relative utility of educational technology, indicate that computer and Internet Access in the classroom alone do not help in bridging the equity gap. Educational and community policies must extend beyond the classroom for this transformation to occur. The educational community must understand that for technology to become ubiquitous, they must be aware of the true definition as defined by Webster dictionary and others as “Existing or being everywhere, or in all places, at the same time; omnipresent”. This presentation will share parent and student raised concerns regarding such things as teachers and the education systems naiveté to this definition. Teachers need to use Internet activities and other classroom projects to embrace the “Least Common Denominator” model, rather than the “what’s new and the latest software the school has” model.

Introduction

For a select group of individuals—that tend to be well educated, more affluent and technology savvy—the computer and the Internet has provided unfettered mobility. For those who have been less socially and economically fortunate, computer and the Internet use has had little impact on lifestyle options and opportunities – or has it? This paper will share results and educational implications from a research project exploring new immigrant and low-income parent and student voices on the relative utility of educational technology. Specifically, the study aimed to reveal opinions about and attitudes toward educational technology, and the substance of opportunities made available to parents and students who intentionally chose to learn and experience more through and via technology. Questions of interest include: What role did educational technology play in their social, political, and economic hopes and dreams? How did educational technology serve their economic, educational and social interests? What skills did they hope to acquire? How could the classroom teacher and educational community serve their needs better?

Significance

Both the formal and informal educational systems are faced with the task of preparing children and young adults to succeed in an increasingly complex and competitive society where proficiency in technology is becoming a requirement for success. The *No Child Left Behind Act* of 2001 requires all students to be technology literate by the eighth grade, and the just recently released *National Education Technology Plan 2004: The Future is Now* lists seven action steps and recommendations including: all teachers and students should be adequately trained in the use of online content, and all students should have ubiquitous access to computers and connectivity (US Department of Education, 2004). Additionally, the 2004 Maryland Business Roundtable Report and the National Advisory Commission on Educational Excellence for Hispanic Americans Report (2003) suggests the need for targeted educational technology programs specific to low-income families, and labor and employment training which includes educational technology issues. Many in the educational arena suggest that these goals will be difficult for many ethnic groups because minority student academic and motivational influences are complex. These influences include family, peer and cultural interactions, and socioeconomic factors, as well as other external elements that education, whether formal or informal, “will not be able to influence.” Research is needed to help educators and policy makers appreciate and understand technology’s impact on minority, low-income and new immigrant achievement.

Background on a Discipline of Opportunity Divide Studies

Proficiency in technology is a requirement for educational success and for employment within the business community. For students to be able to meet the demands of continuing education or future job markets, they must be competent in a wide range of technologies. Familiarity and knowledge of the use of technology has been shown to result in several positive education and employment patterns. Krueger (1993) showed that workers who use

computers (other variables held constant) earn 10-15 percent higher earnings than those who do not. Studies on computer-based instruction aggregated in a meta-analysis by Kulik and Kulik (1991) indicated that computer-based instruction results in positive student outcomes. Glennan and Melmed's (1996) initial data revealed positive effects on student and teacher attitudes and student achievement. Others view educational technology as a productive tool in learner-centered, interactive environments where students are challenged with authentic tasks (Dwyer, 1994; Means & Loson, 1994). Data examined by Collins (1992), in addition to Davidson and Ritchie (1994), reveal that computers result in positive effects on student, parent and teacher attitudes. Studies by the Maryland State Department of Education and the US Government (US Department of Commerce, 1995, 1998, 1999, 2000) have pointed to a growing gap between "technological haves and have nots." The gap in the past has been referred to as the "digital divide", defined as the gap between those students who have access to and make effective use of technology for education (formal and informal) and those who do not. This same concept is also referred to as the "opportunity divide" in technology access for workers, or the general population. While the name may change the concept remains the same, some population groups are less likely to have either computers or other technology-based learning tools at school and/or at home. Although technology use isn't the only factor that contributes to academic and career "success", it is an important one because academic success and employment are becoming increasingly dependent on one's fluency with technology. As a result, educational initiatives and policies are being designed to target this gap.

The US economy is increasingly dependent on a technologically literate work force (Lenhart, 2000). As the economy grows, this need grows accordingly. Thus, the need to increase the technical fluency of all citizens extends beyond benevolence; it becomes a capitalist imperative. The economic costs to society of a technologically uneducated workforce are well documented (Tucker, 1997). Government at all levels has turned its attention to formulating policies to increase technology literacy. The National Telecommunications and Information Administration in the US Department of Commerce began publishing on this topic during the Clinton administration via its *Falling through the Net* series (1995, 1998, 1999, 2000), *The Digital Workforce: Building Infotech Skills at the Speed of Innovation* (Meares and Sargeant, 1999), *How Access Benefits Children* (1999), and *The Emerging Digital Economy II* (1999). These papers showing both the growing digital divide and the importance of technology skills for the 21st Century workforce led to the first large scale federal E-rate funding programs that supported discounts on telecommunications services, Internet access, and networking for schools and libraries. Additionally, funding of Community Technology Centers (CTC) and Technology Opportunities Programs (TOPS) were created to help support the narrowing of the digital divide.

In 2002, the National Telecommunications and Information Administration's (NTIA) report *A Nation Online: How Americans are Expanding their Use of the Internet* helped justify the Bush Administration's funding cuts for both the TOPS and CTC initiatives. The report indicated that Internet access increased by thirty percent, and that Internet use was up in all categories regardless of income, education, age, race, ethnicity or gender. While current public policy and federal mandates distributing federal funding rely on the reports' findings, many (Caswell, 1998, Gordo, 2001, 2002, Krueger, 1993) argue that the report presents an inaccurate assessment of a complex social situation, presuming that having a computer with Internet access is the means that makes possible entry into paths for achievement that ultimately will solve the problems of the poor. Indeed, if access is the primary means to end all problems—then social inequality should not be an issue in the US as the public libraries would fill this role. So if the NTIA report is correct, and the digital divide has gone away, why aren't all citizens technology fluent? Why do US employers identify lack of technology skills in the workforce as one of their main problems?

Current public policy argues that schools make a sizable impact on eliminating this have/have-not divide. The 2001 No Child Left Behind Act (NCLB) requires that every student be technology literate by the time they finish the eighth grade. Through NCLB, by 2005-2006, in order to receive federal funding, school systems/states must determine their definition of eighth grade technology literacy, and must have documentation of the percentage of its eighth grade students who are considered technology literate. Other interesting facts extracted from the US Department of Education's Educational Technology Fact Sheet (2005), leads one to believe we are getting closer to meeting the NCLB technology literacy by eighth grade goals. These include:

- 99 percent of schools and 92 percent of classrooms are connected to the Internet.
- On average, 94 percent of schools are connected to broadband Internet access. 95 percent of the lowest-income schools are connected to broadband Internet access.
- In 2002, 8 percent of public schools lent laptop computers to students. Schools in rural areas (11 percent) were more likely than city schools (6 percent) and urban fringe schools (6 percent) to lend laptops.

- In 2002, 7 percent of public schools provided a handheld computer to students or teachers. Schools in rural areas (10 percent) were more likely than city schools (5 percent) and urban fringe schools (6 percent) to provide them.
- 23 percent of K-12 schools are using wireless.
- The gender divide in computer use has been essentially eliminated, as there is no overall difference between boys and girls in overall use of computers. Girls however are slightly more likely than boys to use home computers for e-mail, word processing and completing school assignments than playing games.

While these statistics make a strong case that the digital divide, as defined by access, has narrowed significantly, many still argue that developing scholarship on the digital or opportunity divide is complicated by limited datasets. Comprehensive and detailed longitudinal studies have yet to collect adequate data on how technology factors affect low-income populations both in the academic arena and the workplace. While some surveys like the 2002 NTIA, collect minimal information regarding home computer access and Internet connection, little data is gathered as to who and what is being done productively with technology (Castells, 1996). Yet, because society uses technology for economic benefit, it matters greatly if one is able to productively function with and via technology.

If as the reports argue, that the digital divide no longer exists in the US, why are low-income families using what little resources (time and money) they have available to pursue additional training in informal educational technology settings? What is the formal educational setting not covering? What is the value added by these informal programs? Theme analysis provides meaningful insights and allows one to build a qualitative model to address these research questions about the processes and experiences by which new immigrants and low-income families can benefit from educational technology.

Theoretical Framework

This research's conceptual base is found in literature that cuts across several fields of study. Specifically, the theoretical framework draws heavily from critical theorist work. Critical theory positions itself as oppositional to the modernist interpretations of life as equal, fair, and democratic for all (Carr-Chellman & Savoy, 2003). Critical theory allows one to uncover the "contradictions, social inequalities, and dominances" (Nichols & Allen-Brown, 1996) about ideas that society is to believe without question. Educational critical theorists (Apple, 1986, 1988, 1990; Bromley, 1992) have continually challenged the status quo with questions such as who really benefits, does the gap actually narrow or does it become even wider, and what are the economic implications of a given educational policy or innovation?

This research argues that ideas that society is to believe without question, such as access to technology resources being equated to technology literacy does in fact need further investigation and in particular, insights from those who are impacted the most: new immigrant and low-income parents and students. Critical theory attempts to view through a variety of lenses, most frequently privileging the perspectives of disempowered populations. This privileging aligns closely with the basic values of this study through several means. First, action research, and in particular participatory action research is a central foundation for critical research. Participatory action research is a research model with a purpose to improve an organization, individual or group with particular applications (Whyte, 1991). Participatory action research empowers those that have traditionally had research done to them instead of actually participating in the design, implementation, and subsequent application of the results of research.

Secondly, constructivism, a form of participatory action research (Jonassen, 1994) has been a significant influence in both formal and informal educational settings over the last decade. "Social constructionism", an extension of constructivism takes into account learning in context, addresses the issues of learning and development, while having broader social implications (Papert, 1990). Social constructionism promotes true social empowerment, arguing that members of a group need tools, skills and knowledge to help them control and develop their own social constructs, rather than operating as one of consumer of information and activities that others produce (Shaw, 1996).

Methods

In order to systematically explore the perspectives of this group of people about the relative utility of educational technology, this study relied on several different approaches to data gathering. Inductive research and use of the qualitative and explanatory case study method were triangulated using different sources of evidence to include:

individual interviews, on-site observations, retrieval of program relevant documents, and demographic questionnaires.

Setting

The technology program is run through the county *Parks and Recreation* housed in a local community center providing inexpensive programs for community members of all ages. The program is advertised through the *Parks and Recreation* catalog, an online catalog version, as well as through word of mouth. Participants enroll in a variety of technology literacy classes for a small fee. Sessions utilize a constructivist based Digital Fluency curriculum (Pruitt-Mentle, 2003) teaching basic through intermediate computer skills, focusing on tools and products that can enhance the life, education, and work experience of the attendees. No grades or tests are given. Free time for technology exploration is also provided before and after class sessions.

Participants

Subjects were current and former parent and student participants involved in a local informal community educational technology program. From the 80 who had participated in the program, 20 participants were selected. Those selected were program participants who were then able to answer questions and reveal the utility of educational technology, while also being volunteers who agreed to complete an information questionnaire and sign the consent agreement.

The participants included five males and ten female adults ranging from ages 18-45 (Mean =31), and five participants who were children of the adults also attending classes, four of which were female and one who was male, ranging in ages from 10-16 (Mean =12). All but three adults spoke English (six were bilingual). These three, one male and two females spoke Spanish. By gender and country, the participants broke down to: two females – Tahiti, two females – Rwanda, three females and two males - El Salvador, two females – Mexico, one male – Guatemala, one male – Sri Lanka and one female and one male African-American – US. Only one of the child participants was foreign born (one female from El Salvador) the others were born in the US. All but one adult participant had children currently enrolled or previously enrolled in the local county school system.

Procedures

Interviews

Each participant volunteered to be interviewed. Informal, semi-structured and unstructured interview techniques were conducted at locations and times based on convenience and appropriateness for the participant. All interviewees received an explanation of the study, and an informed consent form. An interview protocol that suggested possible questions was used to help guide the discussion when needed, aided in taking notes during the interview, and helped facilitate the organization of thoughts and themes after the interview had been completed. Interviews were recorded (audio) with the participants' permission. Verbatim transcripts were done immediately after each interview. Reflective field notes were kept as they provided valuable information, which did not present itself in the transcript of a taped interview.

Observations

Data was gathered through observation techniques at events taking place at the local community technology center. This allowed me to see social patterns: how participants managed to succeed and attend, and how they negotiated their educational lives. I observed participant members while engaged in technology related activities. I was particularly interested in sites and activities they choose, what arrangements they make to balance home and education, how they interacted, how they shared computer knowledge, and how they interacted with the instructor(s). The protocol included both descriptive and reflective notes.

Documentary Evidence

Documentary evidence also informed this study. Data was collected from documents generated by participants, for example, letters, resumes, job search activities, pictures, scrapbooks, cards, poems, homework, classroom projects and activities, etc. All documents and identification were made confidential and protected. All documentary

materials were returned to each of the participants. Several items were given to the instructor as gifts (posters, invitations, business cards created, and poems).

Questionnaire

Basic demographic information was collected through a questionnaire technique. Demographics, such as country of origin, number of years living in the U.S. and in the community, educational background, familiarity with technology, occupational status, economic conditions and cultural background, were gathered. Care was taken not to reveal participants' immigration status, nor expose the specific nature of their employer.

Discussion

Data analysis was conducted over many months. Codes were listed and subsequently organized into more general categories of codes or themes working to address the original questions: What role did educational technology play in their social, political, and economic hopes and dreams? How did educational technology serve their economic, educational and social interests? What skills did they hope to acquire? How could the classroom teacher and educational community serve their needs better? As mentioned, other questions surfaced during the study, such as, why are low-income families using what little resources (time and money) they have available to pursue additional training in informal educational technology settings? What is the formal educational setting not covering? What is the value added by these informal programs?

Theme analysis provides meaningful insights and allows one to build a qualitative model to address these research questions about the processes and experiences by which new immigrants and low-income families can benefit from educational technology. A preliminary summary of the findings shows several themes emerging: (a) the role participants perceive educational technology to play; (b) skills and knowledge valued; (c) disconnect of formal education related to technology; (d) students (and children's) success in school

For brevity, I will discuss some of the findings across themes that would be of most interest to this particular conference audience. Interview data revealed that participants view educational technology opportunities as positively affecting their lives in several major ways: job skills and access to employment opportunities, education and outlook on learning, individual technology goals, skills, and knowledge, personal efficiency, use of time and resources, civic participation and social community skills, and succeeding work wise or enabling their children to succeed in school. While parents enrolled in computer technology classes "to learn more" and "find out more about using the Internet, "so I can find stuff", "email my family", or "to help me find a better job", all adults having children enrolled in the public school system indicated the desire to learn more about technology due to their children. They wanted to find out more about, "the risks and problems with using the Internet", "what my son [or daughter] is doing", or "find out more before we look into buying one [a computer]." All shared the need for their children to have skills with technology "to do better in school" or "for a better job", and wanted "to know more about it [computer use] to help" their child with their school work. When asked how they planned to help their child, several participants explained how their child had to do a report or research paper and needed to find information from the Internet, and also use it [word processor] to type up the paper. One participant shared, "they [county library staff] tell you to just type it in." She and her child had gone to the library to look up information using the Internet, but even after typing in the topic they did not realize that the list of sites that appeared had to be selected to get to the information. Additionally, the child explained how "the teacher did not explain this and assumes we know.... I don't want the other kids to know" [that she didn't know how to search using the Internet].

Parents and students believe teachers do not realize the severity of the equity and access issues which arise when technology assignments or products that require technology knowledge and access are assigned. "Those who can use the computer to complete their paper always get better grades...especially when it looks really good," shares one child. Parents and children expressed concern that while skills such as word processing were becoming essential, no one really covered the how-to's in class. Some indicated that although in middle school they learned some basic typing skills on the word processor, there was really no time to practice. In addition, they wanted to know more about "when I save it [the file] in the media center, I am not sure where it goes." Others wanted to know more about printing so they could turn in the paper for a grade. "While finding information and printing a paper is one thing, it can get pretty expensive when you have to print everything out". While the media centers at schools and local area libraries can be helpful in allowing access to technology, if the student is not fluent with technology, time becomes a

critical barrier. “Just about the time I find something of interest, the bell rings” or “our time is up [local library].” Many students resort to “printing the material out.” Yet, as one parent explained, “no one told use how to cut and paste what we might want to look at later, or that we could just print out the one page.” Parents and students felt that it was becoming too expensive. Many feel “it’s easier just to write it even though it isn’t as good, and I might not get as good a grade.” Teachers attempt to level the playing field by allowing extra time for reports, but equating access to solving the problem leads one to assume that access solves all problems. One needs both access and knowledge/training.

Participants believed teachers use technology in inappropriate ways. Students feel that “school software” can be fun but “pretty unrealistic”, and they wish teachers “would use more applications that we have at home or at the community center or library”. “I really like *Where in the U.S.A. is Carmen Sandiego?* and *Math Detective*, but it doesn’t really help me with what I do at home.” “I’m glad she gets to use the computer at school, but then I wonder why she doesn’t know enough [about computer skills] when we go to the library or to help me.” “Teachers are great at using PowerPoint and basic typing [Word processing], but don’t know a whole lot.” “I had to show my teacher how to insert page numbers.” “One of my teachers swore up and down that double spacing could only be done by hitting the enter key twice.” A major need expressed by all participants was the need to know and have basic technology skills that would allow them or their children to be able to “write nice reports” and do simple tasks like filling out applications and writing resumes. A central theme suggested that educators in the formal setting make use of technology, but in most cases that equates to “the teacher using PowerPoint or logging in attendance.” “Sometimes we can go to the lab and play games or for math [Math Blaster].” These findings parallel Wenglinsky’s (1998) research which documents that access and frequency of use of educational technology does not necessarily lead to an improved environment for students.

Implications

This study constitutes a chapter in the ongoing efforts of new immigrants and low-income families in the United States to manage the transition from one culture to another, one educational environment to another, and one economic, political, social and cultural context to another. Answers help to generate a database from which it becomes possible to assess appropriate approaches to educational technology policy making for diverse minorities.

The thrust of formal educational institutions is to have the newest computers, and the newest software, but a lack of training leaves these features in many cases unused. In addition to cutting edge applications such as 3-D graphics and programming, businesses use technology as a productivity enhancer to produce documents, presentations, to do calculations and graphs, and keep schedules and important information. Our schools, the formal education environment, are not taking advantage of these productivity enhancements as parents and students feel that schools see the need to use “cutting edge” technology, and not the mundane applications that everyone has. Yet, it is these mundane applications which form the centerpiece of 21st Century workforce skills. Teachers must be competent and comfortable enough to allow students to benefit more fully by the direct explorations and hands-on experiences with technology that is considered to be one of the most critical areas of importance to help students of low-income families advance. Thus, evidence further suggests a comparative disadvantage between students with technology “know-how” and those without this edge. One may argue that the formal school setting has made it appear that the digital divide has narrowed. However low income and immigrant students still lack the knowledge to use technology, and therefore, in actuality the digital divide is widening. The technology haves use word processors and worksheets and produce “better” work in a shorter amount of time. The technology have-nots struggle to use computers when they are required, and often must still resort to pencil and paper.

Most agree that young adults need to be computer literate—technology savvy. Given the current state of affairs in today’s formal educational setting, more access to home (or low-income housing tech labs) are needed, students need to have increased access to hands-on exploration with better equipment and resources, particularly in low-income serving schools. This may very well be the only contact some students have to learn technology knowledge and skills. Teachers need to be better prepared to work and teach with technology. Not only do they need to be digitally fluent themselves, but they must have a better understanding about their own biases and the environments they may be creating unintentionally.

References

- Apple, M.W. (1996). *Teachers and texts: A political economy of class and gender relations in education*. New York: Routledge
- Apple, M.W. (1988). Teaching and technology: The hidden effects of computers on teachers and students. In L.E. Beyers & M.W. Apple (Eds.), *The curriculum: Problems, politics, and possibilities* (pp. 289-311). New York: SUNY Press
- Apple, M.W. (1990). *Ideology and criticism*. New York: Routledge.
- Bromley, H. (1992). Culture, power, and educational computing. In C. Bigum & B. Green (Eds.), *Understanding the new information technologies in education: A resource for teachers*. Geelong, Australia: Deakin University Press
- Carr-Chellman, A.A., & Savoy, M.S. (2003). Using the user-design research for building school communities. *The School Community Journal*, 13(2), 99-118.
- Castells, M. (1998). *End of millennium*. Malden, MA: Blackwell Publishers
- Collins, B. (1992). Supporting educational uses of telecommunication in the secondary school: Part II. Strategies for improved implementation. *International Journal of Instructional Media*, 19(2), 97-109.
- Davidson, G., & Ritchie S. (1994). Attitudes toward integrating computers into the classroom: What parents, teachers, and students report. *Journal of Computing in Childhood Education*, 5(1), 3-27.
- Dwyer, D.C. (1994). Apple Classrooms of Tomorrow: What we've learned. *Educational Leadership*, 51(7), 4-10.
- Glennan, T.K., & Melmed A. (1996). *Fostering the use of educational technology: Elements of natural strategy*. Washington, DC: The Rand Corporation.
- Gordo, B. (2001). The digital divide and the persistence of poverty in planners network. [Available at <http://www.plannernet.org/html/pub/archives/141/gordo.html>]
- Gordo, B. (2002). What planning crisis? Reflections on the digital divide and the persistence of unequal opportunity. *Berkeley Planning Journal*, 16(1).
- Jonassen, D.H. (1994). Thinking technology: Toward a constructivist design model. *Educational Technology*, 34(4), 34-37.
- Krueger, A.B. 1993. How computers have changed the wage structure: Evidence from micro data. *The Quarterly Journal of Economics*, 107 (1) 35-78.
- Kulik, C.C., & Kulik, J.A. (1991). Effectiveness of computer-based instruction: An updated analysis. *Computers in Human Behavior*, 7(1-2), 75-94.
- Lenhart, A. (2000, September). Who's Not Online. Pew Internet & American Life Project [Available at <http://www.pewinternet.org/reports/toc.asp?Report=21>]
- Means, B., & Olson, K. (1994). The link between technology and authentic learning. *Educational Leadership*, 51(7), 15-18.
- Maryland Business Roundtable Report (2003). Annual report. Baltimore: Author, Maryland Business Roundtable.
- Mukherjee, A., Pawar, A.S., & Abhishek, V., (2002). Design and science through robotics: Novel aspects of constructionist learning in developing nations. *ThinkCycle Online Journal*, MIT Cambridge, MA.

- National Advisory Commission on Educational Excellence for Hispanic Americans. (2003). From risk to opportunity: fulfilling the educational needs of hispanic americans in the 21st century. Washington, DC: Author, White House Initiative on Educational Excellence for Hispanic Americans
- National Telecommunications and Information Administration (September 1999) How Access Benefits Children [Available from http://www.ntia.doc.gov/otiahome/top/publicationmedia/How_ABC/How_ABC.html]
- Nichols, R.G., & Allen-Brown, V. (1996). Critical theory and educational technology. In D. H. Jonassen (Ed.), Handbook of research for educational communications and technology. Mahwah, NJ: Lawrence Erlbaum Associates.
- Papert, S. (1990). Introduction: Constructivist learning, edited by Idit Harel Cambridge, MA: MIT Media Laboratory.
- Pew Internet and American Life project. (2003) Internet Use by Region in the United States: Regional variations in Internet use mirror differences in educational and income levels. Internet release: http://www.pewinternet.org/pdfs/PIP_Regional_Report_Aug_2003.pdf
- Pruitt-Mentle, D. (2003). Students voices on digital fluency content. Students, learning and technology. Summer Young Scholars Program Conference. College Park, MD.
- Rahman, A. (1993). *People's self-development: Perspectives on participatory action research*. London: University Press Limited
- Shaw, A. (1996). Social Constructionism and the inner city: Designing environments for social development and urban renewal. In *Constructionism in Practice: Designing, Thinking, and Learning in a Digital World*, edited by Yasmin Kafai and Mitchel Resnick, pp. 175-206. Mahwah, NJ: Lawrence Erlbaum Associates.
- Tucker, B. J. (1997). Navigating School: The Perspectives of Successful Mexican-origin High School Student (Doctoral Dissertation, Harvard University, 1997)
- U.S. Department of Commerce. (1995, July). Falling through the net: A survey of the "have nots" in rural and urban America [Available at <http://www.ntia.doc.gov/ntiahome/fallingthru.html>]
- U.S. Department of Commerce. (1998, July). Falling through the net II: New data on the Digital Divide. [Available at <http://www.ntia.doc.gov/ntiahome/net2/falling.html>]
- U.S. Department of Commerce. (1999). The Emerging Digital Economy II. [Available at <http://www.technology.gov/digeconomy/ede/report.html>]
- U.S. Department of Commerce. (1999, June). The Digital Workforce: Building Infotech Skills at the Speed of Innovation. [Available at <http://www.technology.gov/Reports/TechPolicy/digital.pdf>]
- U.S. Department of Commerce. (1999, July). Falling through the net : Defining the Digital Divide [Available at <http://www.ntia.doc.gov/ntiahome/ftn99/contents.html>]
- U.S. Department of Commerce. (2000, October). Falling through the net: Toward digital inclusion [Available at <http://www.ntia.doc.gov/ntiahome/ftn00/Falling.htm#36>]
- US Department of Education (2004). The National Education Technology Plan. Washington D.C. [Available <http://www.nationaletechplan.org/default.asp>]
- Wenglinsky, H. (1998). Does it compute? The relationship between technology and student achievement in mathematics. Princeton, NJ: Educational Testing Service. (ERIC No. ED 425 191).
- Whyte, W.F. (Ed.). (1991). *Participatory action research*. Newbury Park: Sage Publications