

Rethinking digital divide research: datasets and theoretical frameworks

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This chapter tells the US history of the term digital divide, affirms its rootedness in 20th century history, and then reviews empirical research in the US and national data collection in China. Finally, it summarizes and compares several theoretical frameworks for the digital divide. Both the empirical and theoretical approaches are useful for future work in this area.

1 Origin of the term “digital divide”

In a series of January 2001 emails (Irving 2000) on the U.S.-based public listserv digitaldividenetwork, then operated by the policy group called the Benton Foundation, list moderator Andy Carvin and others presented their research and recollections of how and when the expression “digital divide” arose. During 1995-1997, both the U.S. administration and U.S. journalists used the term to describe the social gap between those involved with technology, particularly between children and their schools. Speaking of a mobile computer lab in a truck, Al Gore said, “It’s rolling into communities, connecting schools in our poorest neighborhoods and paving over the digital divide.”

Larry Irving was the founding head of the National Telecommunications Infrastructure Administration at the US Department of Commerce, to which we will return later for their national survey data. In the email exchange, Irving affirms that the NTIA household surveys were “the catalysts for the popularity, ubiquity, and redefinition” of the term. As these early surveys defined it, the digital divide is the social gap between those who have access to and use computers and the Internet and those who do not. The surveys examined the household penetration of telephones and computers and uncovered demographic patterns of information and communications technology (ICT) access and use. Among other things, the studies revealed a “racial ravine” (Falling through the Net 1999, p 8)—a persistent and widening disparity between rates of ICT access and use by white Americans and African Americans.

In the email exchange, Larry Irving defends the term from recent attacks, most prominently by the Republican appointee to the Federal Communications Commission chairmanship, and notes

the wrongheadedness of trying to take a phrase that has near universal acceptance (except for a few K Street and Tysons Corner lobbyists) and understanding and turn it into typical Washington style Orwellian Newspeak, (i.e. Digital Opportunity, a truly meaningless and worthless term.) (Irving 2000)

Elsewhere, Irving roots U.S. concern about the digital divide in “our nation’s almost century long commitment to universal service,” (Irving 2001) which in the 1934 Communications Act referred to telephone service. And at the same time as the NTIA was carrying out large national surveys to

measure the digital divide, it was implementing the Technology Opportunities Program, which was federal policy initiative to advance local community use of ICTs to solve local problems. (Williams 2007)

As Irving understands, names are important. The French have debated whether to call the digital divide a “fossé numérique” (digital ditch) or a “fracture numérique” (digital fracture). (Garrett 2001) These debates are rooted in a deeper history of the term, which we will now explore. This involves acknowledging the information technology revolution and the social polarities associated with it.

Digital divide: rooted in 20th century history

Without the digital, there could be no digital divide. What is the origin of the digital, of the electronic and binary form of information? Many people in many countries have made theoretical and practical contributions to the rise of the digital computer. Claude Shannon, then at Bell Labs in the US, postulated the bit in a thought experiment published in 1948. The information technology revolution has in many ways been the result of implementing Shannon’s “engineering theory of communications,” which was that information translated into 0s and 1s could be sent from source to destination via a channel.

By most accounts, the digital revolution has been underway for more than 60 years. Just a few of the many names and sources for conceptions of this phenomenon have been:

- computer revolution (Berkeley 1962, cited in Beniger 1986, p 4-5)
- knowledge economy (Machlup 1962, cited in Beniger 1986, p 4-5)
- global village based on new mass media and telecommunications (McLuhan 1964, in Beniger 1986, p 4-5)
- scientific-technical revolution (Prague Academy, cited in Beniger 1986, p 4-5)
- third wave (Toffler 1980)
- post-industrial/post-service revolution; information revolution (Jones (1982)
- informationalism (Castells 1989), and
- network society (Castells 1996).

Beniger (1986) provides a much larger collection of conceptualizations of what Jones calls the “economic paradigm shifts” of the last 20th century. But even the few sources included here indicate how scholars have seen that the computer, telecommunications, knowledge, and information are at the heart of this social revolution. Beniger also demonstrates that the then-Soviet Bloc recognized and was studying these same developments. Toffler and Castells are just two who also include biotechnology, itself based on computers used in biology research and on a concept of information (the four nucleotide pairs that make up genetic material) that is rather similar to Claude Shannon’s bit.

Toffler’s Third Wave (1980) was the popularization of the concepts of a third technological revolution following the agricultural and the industrial, a revolution based on developing and linking new technologies—computers and electronics, materials from outer space and the oceans,

genetic engineering, and new energy sources. Jones (1982) wrote from his position as Australia's minister of science.

Castells (1996) presents the concept of the network society: A network of information and communications networks, organizations and people forms the backbone of knowledge generation and information flow, including financial and commercial transactions, marketing, culture. Just as the early builders of electricity systems and telephone systems understood, value arose from the number of customers or nodes on the network. And we return to the concept of the binary digital divide: one can be on or off the network.

This computer revolution did not take place in a vacuum. Castells and Jones are among those who describe a social polarization within the information technology revolution, within the new society. Castells, in a paper titled, "The informational city is a dual city: Can it be reversed?" writes:

[T]he two processes, informationalization and dualization, are intertwined under the current social, political, and economic conditions in most of the world, certainly including American cities. New information technologies are certainly not the cause of this association between informationalization and sociospatial exclusion. The roots of social exclusion are in the politics of capitalist restructuring that have prevailed in most societies since the 1980s. The power of new information technologies, however, enhances and deepens features present in the social structure and in power relationships. ... A real possibility exists of evolving toward systemic urban schizophrenia, that is, toward the dissolution of urban civilization in an undifferentiated exurban sprawl through telecommunicated/freeway-connected, discontinuous spaces, leaving behind "black holes" of poverty, dereliction, and ignorance, abandoned to their fate. (Castells 1999, page 28)

A number of scholars have provided conceptions of social polarity within the information technology revolution:

- the underclass or the truly disadvantaged (Wilson 1987)
- class society (Attali 1991, McChesney 1996, Perelman 1998, Dyer-Witheford 1999, Hodges 2000)
- public sphere and counterpublic sphere—proletarian, Black, feminist (Habermas 1989, Fraswer 1992, Negt and Kluge 1993), Dawson 1994, Alkalimat and Williams 2000), and as mentioned above
- racial ravine (Falling Through the Net 1999)

After examining the African American communities of Chicago, William Julius Wilson presented the concept of the underclass, living in communities recently abandoned by the Black middle class and working class and now inhabited only by unemployed or only briefly employed people and thus isolated from the "job network system that permeates other neighborhoods". (Wilson 1987 p 57) A set of writers explicitly connect the concept of class society to the information technology revolution. McChesney (1996) documents the concentration of wealth and power in just five to eight global media companies making use of ICT and deregulation for cross selling that puts other media organizations at a disadvantage. Perelman (1998) describes the social fractures and the "panopticism" (worker surveillance) involved in what he calls the "mirage of the classless

information society”. Dyer-Witheford (1999) sees the information age as the latest battleground in the encounter between capital and labor, while Hodges (2000) asserts that the expertise of the knowledge worker has overtaken the capital of the corporate owner so that today’s class struggle is in fact post-capitalist, between the professional and the ordinary worker. Among the most vivid and nonchalant of these descriptions of class in the information age comes from the then-president of the European Bank for Reconstruction and Development, Jacques Attali:

Severed from any national allegiance or family ties by microchip-based gadgets that will enable individuals to carry out for themselves many of the functions of health, education, and security, the consumer-citizens of the world’s privileged regions will be “rich nomads.” Able to participate in the liberal market culture of political and economic choice, they will roam the planet seeking ways to use their free time, shopping for information, sensations, and goods only they can afford, while yearning for human fellowship, and the certitudes of home and community that no longer exist because their functions have become obsolete. Like New Yorkers who every day face homeless beggars who loiter around automated teller machines pleading for spare change, these wealthy wanderers will everywhere be confronted by roving masses of “poor nomads”—boat people on a planetary scale—seeking to escape from the destitute periphery, where most of the earth’s population will continue to live. These impoverished migrants will ply the planet, searching for sustenance and shelter, their desires inflamed by the ubiquitous and seductive images of consumerism they will see on satellite TV broadcasts from Paris, Los Angeles or Tokyo. (Attali 1991 p 5)

Distinct from the discussions of class society in the information technology revolution is another theoretical debate concerning social polarity. This is the discussion of the public sphere and the counterpublic sphere. The public sphere is the site of public discourse, a discourse which shapes intellectual and cultural life, policy and public opinion and, along with the economy, the state, and the family sphere, constitutes a society, serving as a space from which to critique the three other spheres. Various scholars have answered this concept, with descriptions of a counterpublic sphere or spheres, created and used by those who have been excluded from the public sphere in order to make their critiques and bring about transformation. Fraser describes the late 20th century feminist subaltern counterpublic, with its “... journals, bookstores, publishing companies, film and video distribution” (Fraser 1992 p 123) creating new vocabulary such as the word sexism. Negt and Kluge (1993) examine a proletarian counterpublic sphere in dynamic opposition to the bourgeois public sphere as technologies and media evolve. Dawson relates: “An independent Black press, the production and circulation of socially and politically sharp popular Black music and the Black church have provided institutional bases for the Black counterpublic since the Civil War.”(Dawson 1994 p 206) Alkalimat and Williams (2000 p 25) document how a community technology center in the African American inner city can be a new institutional base for a counterpublic sphere by means of social cyberpower, the effective use of ICT by groups of people.

In sum, then, the term digital divide has an etymological history which has a strong basis in quantitative data in the United States as well as actual roots in the evolution of the digital revolution and the social polarities it inherited, enhanced, and deepened.

Empirical data on the digital divide

Having identified the digital divide as a social phenomenon rather than merely a technological one, we can now proceed to evaluate how social science has mobilized to measure and understand it. Appendix 1 summarizes a collection of 31 social surveys or reports of surveys concerning the digital divide spanning the years 1995 to 2000: 30 from the U.S. and one from the U.K. These surveys were coded according to three dimensions: as having either a national or a local focus, as taking either the individual/household or the community institution as a unit of analysis, and which sector collected the data.

The baseline research questions across many of the individual or household studies are the same:

Do you have a computer at home?

Do you use a computer at work?

Do you use a computer elsewhere?

These questions correspond to three different settings for computer/Internet use, and allow us to organize the field of digital divide research by three types of computing: personal computing (at home), private computing (on the job), and public computing (not at work or at home). Chow 1998, Stoecker 1997 and Williams 2004 identify 29 wide-ranging settings for public computing: universities, schools, libraries, but also cybercafés, laundromats, and housing developments. Judging from the 32 surveys in appendix 1, only a few public computing settings have been the subject of a digital divide survey or a location for a digital divide survey of individuals. There are also country studies and global studies of the digital divide (for example Barnard 2001, Courier 1997, Understanding the Digital Divide 2001). But none of those obtained for this paper were surveys.

The coding of the Table 5 suggests where the focus of research has been. National surveys outnumber local surveys 23 to 8. Surveys of individuals outnumber surveys of community institutions 20 to 11. Only one survey of individuals focused on workers and therefore was located in the realm of private computing. Just one survey of community institutions was of a virtual institution: the community network. (See van den Besselaar 2000 for a case study of two European digital cities, also virtual).

The extensive social informatics literature on workplace transformations in the digital age has largely relied on case studies, ethnographies, interviews, participant observation and other close-up methods. To find surveys of business organizations, a further exploration of the U.S. Census Bureau and other US federal agencies might fill what appears here as a gap.

With respect to the type of institution that collected the dataset: the government began surveys on this issue 1984; academics in 1994, commercial survey organizations in 1996, and non-profits in 1998. Different sample sizes can lead to different results: Novak 1997, 1998 and Hoffman 1999, 2000 used data from Nielsen/CommerceNet, and offer percentages for white and African American households with computers that appear to overestimate computer ownership compared to data from the much larger U.S. Census/Falling through the Net studies.

In general, the largest and longest running surveys are the government surveys, particularly the U.S. Census (reported in Kominski 1999) and the Falling through the Net studies, which have been carried out in partnership with the U.S. Census.

The 32 quantitative surveys of the digital divide show that the digital divide has been quantified in different ways across three domains of social life (home, workplace, and public spaces) and three corresponding types of computing. For the United States, chief among the public spaces are the nation’s public schools and libraries.

Making use of the 16 year span of data collection by the U.S. Census Bureau and their Falling through the Net partners, we can operationalize the three types of computing as shown in Table 1 below. Personal computing is operationalized as households with computers (and later internet) at home; private computing as individuals using computers at work; and public computing as people using computers at school.

	Percent of households with computer at home	Percent of households with internet at home	Percent of people using computer at work, age 18+	Percent of people using computer at school, age 3-18
1984	8.2	--	24.6	28.0
1989	15.0	--	36.8	46.0
1993	22.8	--	45.8	60.6
1997	36.6	18.6	49.8	70.8
1998	42.1	26.2	--	--
2000	51.0	41.5	--	--
2001	56.2	50.3	53.5	--
2003	61.8	54.6	55.5	83.5
2007	--	61.7	--	--
2009	--	68.7	--	--
2010	--	71.1	--	--

Table 1. Three domains of computer/internet access and use, with national US data: personal, private, and public. Sources: XXX.

Table 1 points up public computing as the most distributed across the population, one could say (but only very roughly) the most democratic, reaching 60.6% of children by 1993. We can see personal computing as the least distributed, even as recent as 2003 when it included 61.2% of households by 2000.

Crosstabulating technology data with demographic data points up digital divides not just between individuals, but between socioeconomic groups. Some groups are more likely to be “wired” than others.

Before we move on, we must take note of at least three caveats to this data. First, what devices are included and not included? Low income urban US populations took up pagers early on as an inexpensive alternative to a phone, and today in every country people are texting; this data looks

presents only the personal computer. Second, school is not all of public computing. Colleges, universities, libraries, are also important sites for public computing, not to mention all the 29 types of sites mentioned above. They may not be as equalizing as K-12 school computer usage is.

Third, school is compulsory. Compulsory computer use might be good at equalizing usage, but is it desirable? Is it something to rely on exclusively?

Finally, and we will discuss this more below, a great deal of information about the varied reality of personal, private and public computing, will remain invisible as long as we just examine answers to the baseline research questions.

But these three figures, limited just to data on the three baseline research questions regarding the digital divide, suggest a second dimension to our nascent research framework of personal, private, and public computing. We now can see there are various types of people who either use those sites or do not. Table 2 provides a 3 by 8 matrix which identifies eight types of individuals in a digitally divided society.

	Personal computing	Private computing	Public computing
Netizenship: connected in three locales	+	+	+
Cyberactivism: connected in two locales	+	+	-
	-	+	+
Online: connected in one locale	+	-	-
	-	+	-
Digital excluded: no direct connection	-	-	+
	-	-	-



Table 2. Becoming digital: A typology of individuals in a digitally divided society

In the dynamic societies across the globe today, one can postulate that people are moving from exclusion to netizenship through various middle stages. Each movement, each stage is far more complex than computer ownership, yes or no, or computer use, yes or no. Past and future research from a variety of disciplines can be organized according to which cell or cells in this matrix it examines.

In addition, as in 12 of the 32 surveys we examined, the unit of analysis does not have to be the individual. The institutional setting also needs to be interrogated and understood. For instance, Williams 2000 takes as its unit of analysis the public library outlet. The paper operationalizes public computing as the number of public access PCs in a given public library outlet, and measures that against a community's digital divide status. The study uses GIS (a geographic information system) and U.S. census demographic data to derive a measure of a community's digital divide status (as suggested by the national census studies) within one mile of each outlet. The results in figure 1 indicate a definite trend line: library outlets in digitally divided communities have fewer computers than those in communities on the rich side of the divide.

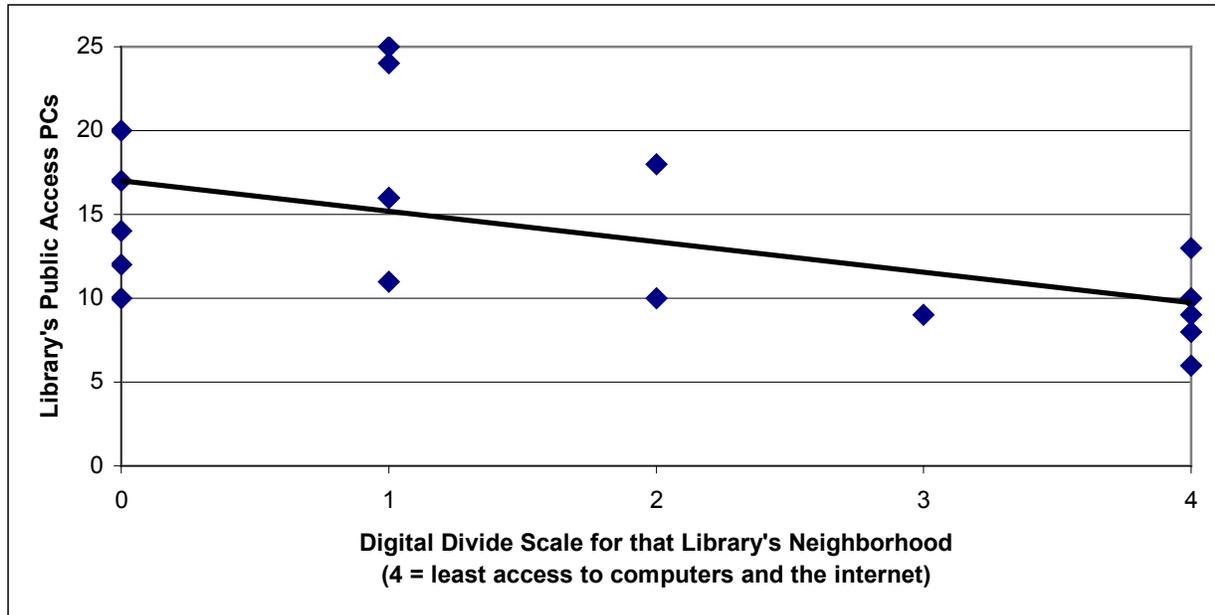


Figure 1. Public computing measured against a community’s need for it; in this city, fewer computers are provided to library branches that are in more digitally divided neighborhoods. (Williams 2000)

In this situation, the public libraries appear to be exacerbating the digital divide. These results bear further research, because the number of computers is an imperfect indicator of public computing: perhaps the libraries with fewer computers have allocated extra money to computer user support, in which case counting computers measures their efforts very poorly.

China and the US

A global phenomenon like the digital revolution, accompanied by country-to-country as well as within-country digital divides, can be best understood using a global approach to research. This is true for solitary scholars as it is for well-resources national surveys. We developed a method to study the questions that are asked by US and Chinese national internet use surveys, and discovered that each country is contributing something different to measuring the digital divide. (This data is more fully reported in Williams and Yan 2009)

Nine categories or general topics, as they are identified in Table 3, emerged from a coding of all the survey questions. The U.S. surveys have emphasized ICT uses, details of connecting to the Internet, places people use ICT, and ownership of digital tools. The Chinese surveys have emphasized ICT uses and people’s attitudes towards all aspects of ICTs. Perhaps reflecting a socialist ideology, there are no Chinese questions about ownership. On the other hand, while China quite steadily maintains a question about “netizens” — with small shifts in the definition of this term — the U.S. survey does not conceptualize or name people who use the Internet. Following from this, the U.S. does not ask people what they know about computers and the Internet, while China asks people if they know certain technological terms from the current discourse.

Topic	Archetypal question	US	China	ITU	OECD
Uses	How do you use computers/the internet?	✓	✓	✓	✓
Connecting	What mechanism do you use to connect to the internet?	✓	✓	✓	✓
Places	Where do you use computers/the internet?	✓	✓	✓	✓
Ownership	What computer/internet devices do you own?	✓		✓	
Attitude	What is your attitude towards computers/the internet?	✓	✓		
Devices	What computer/internet devices do you use?	✓	✓	✓	✓
Frequency	How often do you use computers/the internet?	✓	✓		✓
Identity	Are you a netizen?		✓	✓	
Discourse	What computer/internet related concepts do you know?		✓		

Table 3. Compared to two other existing frameworks for global standardization of data collection, the US and Chinese surveys cover more of the nine aspects. ITU = International Telecommunications Union; OECD = Organization for Economic Cooperation and Development.

Moreover, as Table 3 indicates, the International Telecommunication Union (ITU) survey poses questions on ICT uses, connecting, places, ownership, devices, and identity (ITU, 2007), while the Organization for Economic Cooperation and Development (OECD) survey poses questions on ICT uses, connecting, places, devices, and frequency (OECD, 2009a, 2009b; OECD Working Party on Indicators for the Information Society, 2009). Neither of them asks about attitude or discourse. But both organizations are engaged in an ongoing search for standardized data.

Williams and Yan propose nine archetypal questions (also shown in Table 3) which could be asked worldwide with variation as appropriate to each country, but yielding comparative data. The identity question expresses both practice and self-conceptualization. The discourse question addresses not skills but knowledge, part of mastery of the new tools and the new society. The questions taken together incorporate the U.S. focus that is rooted in the digital divide origins of the U.S. survey: who is connected, where, what are they doing. And they incorporate the Chinese focus on their population’s experience and attitude towards the digital age, conceptualized neatly and powerfully as the netizen.

Theoretical reflections

In research, the empirical measures that come from such large surveys as are analysed above are quite often combined with additional social factors for a richer analysis. They are then summed up theoretical frameworks. Table 4 presents three such frameworks that have been published in the US and Europe, with the leftmost column commenting on and summarizing them. Clement and Shade (1998) propose a seven-part “access rainbow:” carriage facilities (the network), devices, software, online content and services, service/access provision (by which they mean public computing), literacy/social facilitation (the latter meaning training and support), and governance (by which they mean democratic control of cyberspace such as by means of an electronic commons.

	Clement and Shade (1998)	DiMaggio and Hargittai (2001)	van Dijk (2005)
Software, hardware, and the network	Carriage facilities	Equipment	Physical access
	Devices		
	Software tools		
Data	Content/services	Purpose of use	Usage access
Agency			Motivational access
Computer literacy	Literacy/ social facilitation	Skill	Skills access
Social support		Social support	
Governance	Governance	Autonomy of use	--
Place	Service/ access provision		

Table 4. Summarizing across three theoretical frameworks for the digital divide.

DiMaggio and Hargittai propose five components to digital inequality, a term they offer as a more modern and accurate term to cover not only the binary access/lack of access but many variations in access that have emerged as technology diffuses. Their five dimensions are equipment, autonomy of use (which includes place of use, so they compare personal, private and public computing), skill, social support and the purpose of ICT use. Van Dijk offers four components to what he sees in 2005 as the “deepening” digital divide: physical access, motivational access, skills access and usage access. His framework is explicitly relational, meaning that the digital divide inheres in the relations between people, classes, and so on.

In summarizing these three theoretical frameworks into the set of concepts in the leftmost column in table 4, I have sought concepts which are supported by broad literatures—which themselves may have nothing to do with computers. Agency, for example. Especially in phenomenon involving people who are relatively powerless, it is most accurate—but sometimes hardest for a researcher—to start from the agency of people themselves. Any innovation will only be adopted if people see it advancing their own agency, their own interests. Likewise, social support. A vast literature about social support can be marshalled to understand how support works. The concept of literacy is also broad and points to the multidimensionality of computer use. It is also worth noting that governance, the question of who controls the electronic spaces that we use and in effect inhabit, was advanced in 1998 but has dropped out of the later models, even though today users turn to the “cloud” as a place to keep their data, internet service corporations which were household names are today out of existence, and governments (the US included) are considering initiatives that enable them to close down the internet if deemed in the national interest.

In the end, to understand and overcome the digital divide, factors explicitly advanced in theories and factors which are implied, but not stated, in our empirical research need our consideration.

Bibliography

- Adler, R. P. (1999). *Information literacy: Advancing opportunities for learning in the digital age: A report of the Aspen Institute Forum on Communications and Society*. Washington, D.C.: The Aspen Institute.
- Advanced telecommunications in rural America (2000). Washington, D.C.: U.S. Departments of Commerce and Agriculture.
- Alkalimat, A., Gills, D., & Williams, K. (1995). *Job?Tech: The technological revolution and its impact on society*. Chicago: Twenty-First Century Books and Publications.
- Alkalimat, A., & Williams, K. (2000). Social capital and cyberpower in the African American community: A case study of a community technology in the dual city. In L. M. Keeble & B. D. Loader & (Eds.), *Community informatics: Community development through the use of information and communications technologies*. London: Routledge.
<http://www.communitytechnology.org/cyberpower>
- Attali, J. (1991). *Millennium: Winners and losers in the coming world order* (L. Connors & N. Gardels, Trans.). New York: Times Books/Random House Inc.
- Barber, J. T., & Tait, A. A. (2001). *The information society and the Black community*. Westport, Conn.: Praeger Publishers.
- Barnard, J., Clark, A., Dowling, K., & Rhodes, A. (2001). *Digital divide initiatives in France* (web site). London: Department for Education and Employment.
http://www.centres.ngfl.gov.uk/Sharing_Info/francereport.htm
- Becht, D., Taglang, K., & Wilhelm, A. (1999). *The digital divide and the U. S. hispanic population. The digital beat*, 1.
- Bertot, J. C. (1998-1999). Challenges and issues for public managers in the digital era. *The Public Manager*, 27-31.
- Bertot, J. C. (1999). U.S. and Australian public libraries and the Internet: Connectivity issues and policy implications. *Journal of Global Information Management*, 7(4), 18-26.
- Bertot, J. C. (2000). Libraries on the information highway: Issues and lessons learned. In P. D. Fletcher & J. C. Bertot (Eds.), *World libraries on the information superhighway* (pp. 201-209). Hershey, Pa.: Idea Group Publishing.
- Bertot, J. C., & McClure, C. R. (1996). The Clinton administration and the national information infrastructure (NII). In P. Herson & C. R. McClure & H. C. Relyea (Eds.), *Federal information policies in the 1990s: Views and perspectives* (pp. 19-44). Westport, Conn.: Ablex Publishers.
- Bertot, J. C., & McClure, C. R. (1997a). Impacts of public access to the Internet through Pennsylvania public libraries. *Information Technology and Libraries*, 151-164.
- Bertot, J. C., & McClure, C. R. (1997b). Policy issues and strategies affecting public libraries in the national networked environment: Moving beyond connectivity. Washington, D.C.: National Commission on Libraries and Information Science.
- Bertot, J. C., & McClure, C. R. (2000). *Public libraries and the Internet 2000: Summary findings and data tables*. Washington, D.C.: U.S. National Commission on Libraries and Information Science.
- Bertot, J. C., McClure, C. R., & Fletcher, P. D. (1997). *The 1997 national survey of U.S. public libraries and the Internet*. Washington, D.C.: American Library Association Office for Information Technology Policy.

- Bertot, J. C., McClure, C. R., & Owens, K. A. (1999). Universal service in a global networked environment: Selected issues and possible approaches. *Government Information Quarterly*, 16(4).
- Bertot, J. C., McClure, C. R., & Ryan, J. Statistics and performance measures for public library networked services.
- Bertot, J. C., McClure, C. R., & Ryan, J. (1999). Possible statistics and performance measures for the networked environment: Participant briefing paper.
- Bertot, J. C., McClure, C. R., & Zweizig, D. L. (1996). The 1996 national survey of public libraries and the Internet: Progress and issues. Washington, D.C.: National Community on Libraries and Information Sciences. http://www.ist.syr.edu/~mcclure/nspl96/NSPL96_T.html
- Birdsell, D., Muzzio, D., Krane, D., & Cottreau, A. (1998). The elections of 1998: Getting connected to the Web. *Public perspective*, 9(3), 33.
- Bishop, A. P., Mehra, B., Bazzell, I., & Smith, C. (2000). Social grounded user studies in digital library development. *First Monday*, 5(6).
http://firstmonday.org/issues/issue5_6/bishop/index.html
- bridges.org. (2001). Spanning the digital divide: Understanding and tackling the issues. Durbanville, South Africa: bridges.org. <http://www.bridges.org/spanning/report.html>
- Brynjolfsson, E., & Kahin, B. (Eds.). *Understanding the digital economy*. Cambridge, Mass.: MIT Press. <http://mitpress.mit.edu/book-table-ofcontents.tcl?isbn=0262024748>
- Buechler, S. M. (2000). *Social movements in advanced capitalism: The political economy and cultural construction of social activism*. Oxford: Oxford University Press.
- Carvin, A. (2000). *Beyond access: Understanding the digital divide*.
<http://www.benton.org/Divide/thirdact/speeches.html>
- Castells, M. (1989). *The informational city: Information technology, economic restructuring, and the urban-regional process*. Oxford: Basil Blackwell.
- Castells, M. (1996). *The rise of the network society (Vol. I)*. Oxford: Blackwell Publishers.
- Castells, M. (1997). *The power of identity (Vol. II)*. Oxford: Basil Blackwell Ltd.
- Castells, M. (1998). *End of millenium (Vol. III)*. Oxford: Basil Blackwell Ltd.
- Castells, M., & Hall, P. (1994). *Technopoles of the world: The making of twenty-first century industrial complexes*. London: Routledge.
- Chow, C., Ellis, J., Mark, J., & Wise, B. (1998). *Impact of CTCNet affiliates: Findings from a national survey of users of community technology centers*. Newton, Mass.: Community Technology Centers Network/Educational Development Center, Inc.
<http://www.ctcnet.org/impact98.htm>
- Coley, R. J., Cradler, J., & Engel, P. K. *Computers and classrooms: The status of technology in U.S. schools*. Princeton, N. J.: Educational Testing Center, Policy Information Center.
<http://www.etc.org/research/pic/compclass.html>
- Communications and information technology(2000)., *Statistical abstract of the United States*. Washington, D.C.: U. S. Census Bureau. Conte, C. (1998). *Society and information infrastructure: The next generation*. Paper presented at the Networks for People, Washington, D.C.
- Courier, Y., & Large, A. (Eds.). (1997). *World Information Report 1997/98*. Paris: UNESCO Publishing.
- Crandall, R. W. (2001). Bridging the divide--naturally. *Brookings Review*, 19(1), 38-43. <http://www.brookings.edu/press/REVIEW/winter2001/crandall.htm>

- Czerwinzki, S. (2001). Telecommunications: Characteristics and choices of Internet users: Report to the ranking minority member, Subcommittee on telecommunications, Committee on energy and commerce, House of Representatives. Washington, D.C.: U.S. General Accounting Office.
- David, P. A. Understanding digital technology's evolution and the path of measured productivity growth: Present and future in the mirror of the past. In E. Brynjolfsson & B. Kahin (Eds.), *Understanding the digital economy*. Cambridge, Mass.: MIT Press.
- Davis, J., Hirschl, T. A., & Stack, M. (Eds.). (1997). *Cutting edge: Technology, information, capitalism and social revolution*. London: Verso.
- Developing national data collection models for public library network statistics and performance measures(2000)., [web page]. Information Use Management and Policy Institute, Florida State University. Available: <http://www.ii.fsu.edu/Projects/IMLS/IMLS.abstract.html>.
- Duderstadt, J. J. (1996). *The American university in the digital age*. <http://milproj.ummu.umich.edu/publications/digital/index.html>
- Dunlop, C., & Kling, R. (Eds.). (1991). *Computerization and controversy: Value conflicts and social choices*. San Diego: Academic Press.
- Dyer-Witheford, N. (1999). *Cyber-Marx: Cycles and circuits of struggle in high-technology capitalism*. Urbana, Ill.: University of Illinois Press.
- Ebo, B. (Ed.). (1998). *Cyberghetto or cybertopia: Race, class and gender on the Internet*. Westport, Conn.: Praeger.
- Ebo, B. (Ed.). (2001). *Cyberimperialism: Global relations in the new electronic frontier*. Westport, Conn.: Praeger.
- Educating library and information science professionals for a new century: The KALIPER report: Executive summary (2000). Reston, Virginia: Association for Library and Information Science Education. http://www.alise.org/nondiscuss/kaliper_final.pdf
- Eglash, R. (1999). *African fractals: Modern computing and indigenous design*. New Brunswick, N. J.: Rutgers University Press.
- Eglash, R. (2001a). email to listserv at cpsr@cpsr.org.
- Eglash, R. (2001b). *Community informatics: A two-way bridge approach*, [web site]. Available: <http://www.rpi.edu/~eglash/eglash.dir/ci.htm>.
- Ellin, A. (2000, June 4, 2000). High-tech philanthropy in a low-tech Guatemalan village. *The New York Times*, pp. 15.
- Ervin, K. S., & Gilmore, G. (1999). Traveling the superinformation highway: African Americans' perceptions and use of cyberspace technology. *Journal of Black Studies*, 29(3), 398-407.
- Falling through the net: Defining the digital divide: A report on the telecommunications and information technology gap in America (1999). Washington, D. C.: U. S. Department of Commerce. <http://www.ntia.doc.gov/ntiahome/fttn99/FTTN.pdf>
- Falling through the net: Toward digital inclusion: A report on Americans' access to technology tools (2000). Washington, D.C.: U. S. Department of Commerce. <http://search.ntia.doc.gov/pdf/fttn00.pdf>
- Florida, R., & Gates, G. (2001). *Technology and tolerance: The importance of diversity to high-technology growth*. Washington, D.C.: The Brookings Institution Center on Urban and Metropolitan Policy.
- Fraumeni, B. M., Manser, M. E., & Mesenbourg, T. L., Jr. (2000). Government S----- E-commerce----- (title not clear). <http://www.census.gov/econ/www/ecomm2.htm>

- Freeman, L. (1996). Home computer market: Job creation and the emerging home computer market. *Monthly Labor Review*, 46-56.
- From access to outcomes: raising the aspirations for technology initiatives in low-income communities (2001). Reston, Va.: Morino Institute.
- Garrett, F. (2001). email to listserv at digitaldivide@cdinet.com.
- Gee, J. P. (1999). Critical issues: Reading and the New Literacy Studies: Reframing the National Academy of Sciences report on reading. *Journal of Literacy Research*, 31(3), 355-374.
- Gilder, G. (2000). *Telecosm: How infinite bandwidth will revolutionize our world*. New York: The Free Press.
- Gladieux, L. E., & Swail, W. S. New Internet-based technologies may deepen divide between educational haves and have-nots. Washington, D.C.: The College Board.
- Gladieux, L. E., & Swail, W. S. (1999). The virtual university and educational opportunity: Issues of equity and access for the next generation. Washington, D. C.: The College Board.
- Goslee, S. (1998). *Losing ground bit by bit: Low-income communities in the information age*. Washington, D. C.: Benton Foundation.
- Graham, P. (1999, July 5-7, 1999). *Hypercapitalism: Political economy, electric identity, and authorial alienation*. Paper presented at the Exploring Cybersociety, Northumbria University, Newcastle, UK.
- Greaves, D. (1997). *Information technology and the future of the university*. Durban, South Africa: University of Natal.
- Haltiwanger, J., & Jarmin, R. S. *Measuring the digital economy*. In E. Brynjolfsson & B. Kahin (Eds.), *Understanding the digital economy*. Cambridge, Mass.: MIT Press.
- Hampton, K. N., & Wellman, B. (2000). Examining community in the digital neighborhood: Early results from Canada's wired suburb. In T. Ishida & K. Isbister (Eds.), *Digital Cities*. Weisbaden, Germany: Springer Verlag.
- Hawkins, R., & Paris, A. E. (1997). Computer literacy and computer use among college students: Differences in Black and white. *Journal of Negro Education*, 66(2), 147-158.
- Hecht, L. U.S. community networks and the services they offer. Washington, D.C.: Internet Public Policy Institute. <http://www.internetpublicpolicy.com/communitynetworks.html>
- Highlights of NCES Surveys(1998)., Library research and statistics.
- Historically Black colleges and universities: An assessment of networking and connectivity (2000). Washington, D.C.: U. S. Department of Commerce National Telecommunications and Information Infrastructure.
- Hodges, D. C. (2000). *Class politics in the information age*. Urbana, Ill.: University of Illinois Press.
- Hoffman, D. L., & Novak, T. P. The growing digital divide: Implications for an open research agenda. In E. Brynjolfsson & B. Kahin (Eds.), *Understanding the digital economy*. Cambridge, Mass.: MIT Press.
- Hoffman, D. L., Novak, T. P., & Schlosser, A. E. (1999, 2000). The evolution of the digital divide: How gaps in Internet access may impact electronic commerce. *Journal of Computer-Mediated Communication*, 5(3). <http://www.ascusc.org/jcmc/vol5/issue3/hoffman.html>
- Hunka, G. (1999). Lesson learned: Some thoughts on the future of on-line community networks. *Cybersociology*(5). <http://www.cybersociology.com/>
- Information Technology Indicators Residential Survey (2000). Seattle, Wa.: City of Seattle Department of Information Technology. <http://www.cityofseattle.net/tech/indicators/Data%20Collection.htm>

- Internet access in U. S. public schools and classrooms: 1994-2001 (NCES 2001071)(2001). Washington, D.C.: U. S. Department of Education, Office of Educational Research and Improvement.
- Irving, L. (2001, June 30, 2001). Michael Powell's 'Mercedes divide'. Washington Post, pp. A30. <http://www.washingtonpost.com/wp-dyn/articles/A19302001Jun29.htm>
- Irving, L., Carvin, A., Myrland, S., & Hallman, J. (2000). Origin of the term digital divide, [emails collected off of Benton Foundation's digitaldividelist listserv]. Hallman, Judy. Available: <http://www.rtpnet.org/lists/rtpnnettact/msg00080.html>.
- Issues in labor statistics: Computer ownership up sharply in the 1990s (Summary 99-4 March 1999)(1999). Washington, D.C.: U.S. Department of Labor, Bureau of Labor Statistics.
- Jaeger, B. (2000). From telecottages to digital cities: What was the outcome of all the social experiments? Roskilde, Denmark: Roskilde University Department of Social Sciences. <http://www.ssc.ruc.dk/>
- Jones, B. (1982). Sleepers, wake: Technology and the future of work (1990 edition ed.). Melbourne: Oxford University Press Australia.
- Jordan, T. (1999). Cyberpower: The culture and politics of cyberspace and the Internet. London: Routledge.
- Kling, R., & Lamb, R. IT and organizational change in digital economies: a sociotechnical approach. In E. Brynjolfsson & B. Kahin (Eds.), Understanding the digital economy. Cambridge, Mass.: MIT Press.
- Koku, E., Nazer, N., & Wellman, B. (1999). Netting scholars: Online and offline. American Behavioral Scientist, 43.
- Kolko, B. E., Nakamura, L., & Rodman, G. B. (Eds.). (2000). Race in cyberspace. London: Routledge.
- Kominski, R. (1992). Computer use in the United States: The Bureau of the Census surveys. U.S. Census Bureau, Population Division. Available: <http://www.census.gov> click on c click on computer then scroll.
- Kominski, R., & Newburger, E. (1999). Access denied: Changes in computer ownership and use: 1984-1997, [paper presented at the annual meeting of the American Sociological Association, Chicago, Illinois, August 1999]. U.S. Census Bureau, Population Division. Available: <http://www.census.gov> click on c, then computer, then scroll.
- Kuhn, T. S. (1962, 1970). The structure of scientific revolutions (2nd enlarged ed.). Chicago: University of Chicago Press.
- Langman, L., Morris, D., Zalewski, J., Ignacio, E., & Davidson, C. (2000). Globalisation, domination and cyberactivism.
- Lankshear, C. (1997). Changing literacies. Buckingham: Open University Press.
- Lankshear, C., & Lawler, M. (1987). Literacy, schooling and revolution. Lewes, East Sussex: The Falmer Press.
- Lazarus, W., & Mora, F. (2000). Online content for low-income and underserved Americans: The digital divide's new frontier. Santa Monica, Calif.: The Children's Partnership. http://www.childrenpartnership.org/pub/low_income/low_income.pdf
- Lee, E. (1997). The labour movement and the internet: The new internationalism. London: Pluto Press.
- Lenhart, A. (2000). Who's not online: 57% of those without Internet access say they do not plan to log on. Washington, D. C.: Pew Internet and American Life Project. <http://www.pewinternet.org>

- Lentz, B., Straubhaar, J., LaPastina, A., Main, S., & Taylor, J. (2000). Structuring access: The role of public access centers in the "digital divide". Austin, Texas: University of Texas Telecommunications and Information Policy Institute.
http://www.utexas.edu/research/tipi/reports/joe_ICA.pdf
- Lévy, P. (1997). *Collective intelligence: Mankind's emerging world in cyberspace* (R. Bonnonno, Trans.). New York: Plenum Press.
- Lévy, P. (1998). *Becoming virtual: reality in the digital age* (R. Bonnonno, Trans.). New York: Plenum Press.
- Licklider, J. C. The computer as a communications device. <http://memex.org/LickLider.pdf>
- Loader, B. D. (Ed.). (1998). *Cyberspace divide: Equality, agency and policy in the information society*. London: Routledge.
- Local places, global connections: Libraries in the digital age (1997). Washington, D.C.: Benton Foundation. <http://www.benton.org/Library/Libraries/>
- Mark, J., Corneise, J., & Wahl, E. (1997). *Community technology centers: Impact on individual participants and their communities*. Newton, Mass.: Education Development Center.
<http://www.ctcnet.org/eval.html>
- Martin, W. J. (1982). Information and the socially deprived. In G. P. Sweeney (Ed.), *Information and the transformation of society*. Amsterdam: North-Holland Publishing Company.
- McChesney, R. W., Wood, E. M., & Foster, J. B. (Eds.). (1996). *Capitalism and the information age* (Vol. 48). New York: Monthly Review.
- McClure, C. R., & Bertot, J. C. (1997). Creating a future for public libraries: Diverse strategies for a diverse nation. *Library Trends*, 46(1), 36-51.
- McConnaughey, J. W., & Lader, W. (1998). *Falling through the Net II: New data on the digital divide*. Washington, D. C.: U.S. Department of Commerce National Telecommunications and Information Administration.
- McConnaughey, J. W., Nila, C. A., & Sloan, T. (1995). *Falling through the Net: A survey of "have nots" in rural and urban America*. Washington, D.C.: U.S. Department of Commerce.
<http://www.ntia.doc.gov/ntiahome/fallingthru.html>
- McConnell, S. (1996). Computers and employment: An overview: The role of computers in reshaping the workforce. *Monthly Labor Review*, 3-5.
- Melchior, A., Thorstensen, B., & Shurkin, M. (1998). *The uses of technology in youth-serving organizations: An initial scan of the field*. Waltham, Mass.: The Center for Human Resources, Brandeis University.
- Mitchell, W. J. (1999). *e-topia: "Urban life, Jim -- but not as we know it"*. Cambridge, Mass.: MIT Press.
- Moulton, B. GDP and the digital economy: Keeping up with the changes. In E. Brynjolfsson & B. Kahin (Eds.), *Understanding the digital economy*. Cambridge, Mass.: MIT Press.
- NAICS Economic Classification Policy Committee. NAICS (North American Industry Classification System): New data for a new economy. Washington, D.C.
- Nakamura, L. *Race in/for cyberspace: Identity tourism and racial passing on the Internet*. Available: <http://acorn.grove.iup.edu/en/workdays/Nakamura.html>.
- National Research Council Committee on Information Technology Literacy. (1999). *Being fluent with information technology*. Washington, D.C.: National Academy Press.
<http://www.nap.edu/catalog/6482.html>
- Negt, O., & Kluge, A. (1993). *Public sphere and experience: Toward an analysis of the bourgeois and proletarian public sphere* (Vol. 85). Minneapolis, Minn.: University of Minnesota Press.

- Nelson, A., Tu, T. L. N., & Hines, A. H. (Eds.). (2001). *Technicolor: Race, technology and everyday life*. New York: New York University Press.
- The new GVU/DCOM WWW survey(2000). Available:
<http://www.cc.gatech.edu/gvu/wwwinit/survey.html>.
- Novak, T. P., & Hoffman, D. L. (1998). *Bridging the digital divide: The impact of race on computer access and Internet use*. Nashville, Tenn.: Vanderbilt University.
<http://www2000.ogsm.vanderbilt.edu/papers/race/science.html>
- Novak, T. P., Hoffman, D. L., & Venkatesh, A. (1997, 1998). *Diversity on the Internet: The relationship of race to access and usage*. In A. Garmer (Ed.), *Investing in Diversity: Advancing Opportunities for Minorities and the Media*. Washington, D. C.: The Aspen Institute. <http://www2000.ogsm.vanderbilt.edu/papers/aspen/diversity.on.the.internet.oct24.1997.html>
- Nunberg, G. (1998). *Will libraries survive? The American Prospect*, 16-23.
- Paltridge, S. (2000). *Local access pricing and e-commerce*. Paris, France: Organization for Economic Cooperation and Development, Directorate for Science, Technology and Industry, Committee for Information, Computer and Communications Policy.
- Perelman, M. (1998). *Class warfare in the information age*. New York: St. Martin's Press.
- Policy Action Team 15 (U.K.). (2000). *Closing the digital divide: Information and communication technologies in deprived areas.*: U.K. Department of Trade and Industry.
<http://www.pat15.org.uk/>
- Poster, M. (2001). *What's the matter with the Internet? (Vol. 3)*. Minneapolis, Minn.: University of Minnesota Press.
- Potts, C. H. (1999). *The digital divide: Social justice in the information age. Issues in education and technology(1)*. <http://centerx.gseis.ucla.edu/x/projects/etech/dd.htm>
- Powell III, A. C. (1998). *Net demographics starting to even out, survey finds.*: The Freedom Forum Online.
- Press release - 2000 public library internet study - 2/8/2000(2000). U.S. National Commission on Libraries and Information Science. Available:
<http://www.nclis.gov/news/pressrelease/pr200/bertot.html>.
- Press release - Quality education data (QED) releases Internet usage report on K-12 public schools 2000 -10/18/2000(2000). QED/Scholastic Inc. Available:
http://www.qeddata.com/iups_pr.htm.
- Rassool, N. (1999). *Literacy for sustainable development in the age of information (Vol. 14)*. Clevedon, England: Multilingual Matters Ltd.
- Rifkin, J. (1995). *The end of work: The decline of the global labor force and the dawn of the post-market era*. New York: G. P. Putnam's Sons.
- Rifkin, J. (1998). *The biotech century: Harnessing the gene and remaking the world*. New York: Penguin Putnam Inc.
- Rifkin, J. (2000). *The age of access: The new culture of hypercapitalism, where all of life is a paid-for experience*. New York: Penguin Putnam Inc.
- Rockman et al. (1999). *Good neighbors and stargazers: Community service, school reform, and the Chicago Public Schools and University of Chicago Internet Project*.
<http://www.rockman.com/projects/cuip/cuip99.pdf>
- Rose, S. (1997). *The role of community access centers in bridging the technology gap*. Unpublished Master's, Tufts University, Medford, Mass. <http://www.ctcnet.org/rose/00title.htm>

- Sandor, L., & Scheuerer, K. (2000). Surely someone knows how to do this: Organizing information flows of community technology centers. Ann Arbor, Mi.: University of Michigan Community Connector. <http://www.si.umich.edu/community/connections/findingsreport.html>
- Sayed, Y. (1998). The segregated informaton highway: Information literacy in higher education. Cape Town: University of Cape Town Press.
- Schement, J. R. (1996). Thorough Americans: Minorities and the new media (paper presented at an Aspen Institute conference in October 1996): Pennsylvania State University College of Communications. <http://www.benton.org/Policy/Schement/Minorities/home.html>
- Schön, D. A., Sanyal, B., & Mitchell, W. J. (Eds.). (1999). High technology and low-income communities: Prospects for the positive use of advanced information technology. Cambridge, Mass.: MIT Press.
- Servon, L., & Nelson, M. K. (2000). Why planners should help close the digital divide: Democracy, equity and economic sustainability rationales.
- Shannon, Claude
- Shapiro, R., Price, L., & Mayer, J. (2000). Digital economy 2000. Washington, D.C.: U. S. Department of Commerce. <http://www.esa.doc.gov/de2000.pdf>
- Simms, M. C. (2000). National opinion poll fact sheet: Internet use, 1998 and 1999. Washington, D.C.: Joint Center for Political and Economic Studies. <http://www.jointcenter.org/factshts/nopfcsh.pdf>
- Smith, M. A., & Kollock, P. (Eds.). (1999). Communities in cyberspace. London: Routledge.
- Spooner, T., & Rainie, L. (2000). African-Americans and the Internet. Washington, D.C.: Pew Internet and American Life Project. <http://www.pewinternet.org/reports/toc.asp?Report=25>
- Starrs, P. F., & Huntsinger, L. (1995). The Matrix, cyberpunk literature, and the apocalyptic landscapes of information technology. *Information Technoloy and Libraries*, 14(4), 251-256.
- Steering Committee on Research Opportunities Relating to Economic and Social Impacts of Computing and Communications of the National Research Council. (1998). Fostering research on the economic and social impacts of information technology. Washington, D.C.: National Academy Press. <http://www.nap.edu/readingroom/books/esi/>
- Stoecker, R., & Stuber, A. (1997a). Building an information superhighway of one's own: A comparison of two approaches. *Research in Politics and Society*, 7. <http://uac.rdp.utoledo.edu/docs/catnet/UAApaper.htm> but may not be current
- Stoecker, R., & Stuber, A. (1997b). Limited access: The information superhighway and Ohio's neighborhood-based organizations. *Computers in Human Services*, 14, 39-57.
- Student computer use: Indicator of the month (1999). Washington, D.C.: National Center for Education Statistics.
- Toffler, A. (1980). *The third wave* (1981 ed.). New York: Bantam Books Inc.
- Toffler, A., & Toffler, H. (1995). *Creating a new civilization: The politics of the third wave*. Atlanta: Turner Publishing.
- Towns, S. (2001). *Defining the divide*, [web site]. Govtech.net. Available: <http://www.govtech.net/>.
- Turow, J., & Nir, L. (2000). *The Internet and the family 2000: The view from parents, the view from kids*. Philadelphia, Penn.: The Annenberg Public Policy Center of the University of Pennsylvania. http://www.appcpenn.org/internet/family/finalrepor_fam.pdf
- U. S. National Commission on Libraries and Information Science. (1999a). *Library statistics cooperative program*.

- U. S. National Commission on Libraries and Information Science. (1999b). Moving toward more effective public Internet access: The 1998 national survey of public library outlet Internet connectivity; a report based on research [...] conducted by John Carlo Bertot and Charles R. McClure. Washington, D.C.: U.
- S. Government Printing Office.
- U.S. Bureau of the Census(2001)., [web site]. U.S. Bureau of the Census. Available: <http://www.census.gov> July 1, 2001]. The UCLA internet report: Surveying the digital future (2000).: UCLA Center for Communication Policy. <http://www.ccp.ucla.edu/pages/internet-report.asp> Understanding the digital divide (2001). Paris: Organization for Economic Cooperation and Development (OECD). United States Internet Council, & ITTA Inc. (2000). State of the Internet 2000. Washington, D.C. <http://usic.wslogic.com/intro.html>
- van den Besselaar, P., Melis, I., & Beckers, D. (2000). Digital cities: Organization, content, and use. In T. Ishida & K. Isbister (Eds.), Digital cities: Experiences, technologies and future perspectives. Lecture notes in computer science 1765 (pp. 18-32).
- various charts from www.census.gov.
- Warschauer, M. (1999). Electronic literacies: Language, culture and power in online education. Mahwah, N. J.: Lawrence Erlbaum Associates.
- Warschauer, M. (2001). What is the digital divide? Unpublished manuscript. <http://www.gse.uci.edu/markw>
- Weissinger, T. (1998). Defining Black studies on the World Wide Web. *Journal of Academic Librarianship*, 24(4), 288-293.
- Wellman, B., Haase, A. Q., Witte, J., & Hampton, K. (2001 forthcoming). Does the Internet increase, decrease, or supplement social capital? Social networks, participation, and community commitment. *American Behavioral Scientist*, 45. <http://www.chass.utoronto.edu/~wellman/publications/netadd/netadd8b4.htm>
- What is the digital divide(2001)., [web page]. jointventure.org. Available: <http://www.jointventure.org/digitaldiv/definition.htm> [2001, July 12, 2001].
- Wilhelm, A. (1997). Buying into the computer age: A look at hispanic families. Claremont, Calif.: The Tomás Rivera Policy Institute at Claremont Graduate University.
- Williams, K. (2000). Library computers bridging the digital divide: An illustration of the usefulness of geographic information systems. Unpublished manuscript.
- Williams, K. "Community informatics memory as archive: Assembling and using the records of the Technology Opportunities Program (USA), 1994-2005" pages 343-351 in *Constructing and Sharing Memory: Community Informatics, Identity and Empowerment*, Graeme Johanson and Larry Stillman, editors. Cambridge, England: Cambridge Scholars Press, 2007.
- Wilson, W. J. (1987). The truly disadvantaged: The inner city, the underclass, and public policy. Chicago: University of Chicago Press.
- Wolfe, G. (1995). Libraries on the superhighway: Rest stop or road kill? *Information Technology and Libraries*, 14(4), 219-225.
- Work trends: American's attitudes about work, employers and government: Nothing but net: American workers and the information economy (2000).: John J. Heldrich Center for Workforce Development at Rutgers, The State University of New Jersey. <http://www.heldrich.rutgers.edu/whatsnew/full%20report1.pdf>
- Wyden, R. (2000). Oregon seniors and the digital divide: A survey of senior centers' Internet access in the new millenium.

Appendix 1. Thirty two US or UK digital divide surveys, 1995-2001.					
Citation (note that year of citation may not equal year of data collection)	N	Unit of analysis	National or local	Individual or community focus	Dataset
John J. Heldrich Center for Workforce Development 2000	1005	Adults in the workforce	N	I	academic
UCLA 2000	2096	Households (panel study)	N	I	academic
Turow 2000	1001 parents and 304 children	Parents and their children	N	I	academic
Birdsell 1998	15000 in 15 different surveys	Individuals	N	I	commercial
Lenharet 2000, also Spooner 2000	12751 (some Qs smaller)	Households	N	I	commercial
Czerwinski 2001	1135	Internet users	N	I	commercial
Novak 1997, 1998	6487	Individuals	N	I	commercial
Hoffman 1999, 2000	5813 (1996-97), 7157 (1997), and 4042 (1998)	Individuals	N	I	commercial
Kominski 1999	50000	Households	N	I	government
McConnaughey 1995	54000	Households	N	I	government
McConnaughey 1998	48000	Households	N	I	government
Falling Through the Net 1999	48000	Households	N	I	government
Falling Through the Net 2000	48000	Households	N	I	government
Chow 1998	817	Users of community technology centers	N	I	non-profit
Simms 2000	1606 (1998) and 1678 (1999)	Adults	N	I	non-profit
Hawkins 1997	570	Undergraduates at a northeastern university	L	I	academic
Wilhelm 1997	72	Middle income Hispanic Californians	L	I	academic
Ervin 1999	247	Students at a pacific northwest university	L	I	academic
Lentz 2000	830	Users of libraries and community technology centers	L	I	academic
City of Seattle 2000	1011	Seattle residents	L	I	commercial
Bertot 1996	1059	Public library systems	N	CI	academic
Bertot 1997	1426	Public library systems	N	CI	academic
Melchior 1998	100	Youth serving organizations	N	CI	academic
US National Commission on Libraries and Information Science 1999	1888	Public library outlets	N	CI	academic
US Department of Education 2001	100 each year since 1994	K-12 schools	N	CI	government
UK Policy Action Team 15 2000	200+	Public computing sites	N	CI	government
US Department of Commerce 2000	80	HBCUs and other equal opportunity educational institutions	N	CI	government
Hecht	68	Community networks	N	CI	non-profit
Stoecker 1997	189	Ohio neighborhood based organizations	L	CI	academic
Bertot 1997	188	Pennsylvania public library outlets	L	CI	academic
Williams 2000	18	Midwestern city public library outlets	L	CI	academic
Wyden 2000	100	Oregon senior centers	L	CI	government