THE IMPACT OF THE DIGITAL DIVIDE ON SCHOLARLY COMMUNICATION

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Introduction

For almost a decade, governments and organizations have spent resources in an attempt to bridge the digital divide. Many of these efforts have focused on giving access to computers and the Internet. Some even included attempts at computer skills training. (Kirschenbau & Kunamneni 2001). However, skills become obsolete with new technologies. So while specific skills may be helpful, an understanding of the underlying concepts is necessary for individuals to continue to expand their knowledge and adapt to new information technologies (Lin 2000). The emphasis on technology and access has masked some important aspects of the digital divide, including availability and production of relevant content, developing information communities, and understanding of the applications of technology.

What is Information Literacy?

The dictionary definition of literacy includes an ability to read and write; having some skill or competence; and an element of learning (Bawden 2001). However, the concept of literacy has always been relative. To be literate in day-to-day life or to be literate in oceanography have different meanings. One can be functionally illiterate and still function in society. Can one be functionally illiterate as a scientist? Snavely and Cooper (1997) identified 34 examples of specific types of literacy, including agricultural literacy, workplace literacy, and geographic literacy. There have probably been many more named since their study in 1997.

In library or bibliographic instruction we may see the beginnings of information literacy. For many years librarians have tried to teach users to be self-sufficient in the information provided by a library. In recent years, that concept has expanded to include all information sources.

Information literacy is not on thing. Building on the literacies identified by the Institute for Information Literacy (2002) and Shaprio and Hughes (1996), a definition of information literacy includes:

Tool Literacy -- The ability to evaluate (critical thinking) and effectively use print and electronic resources, including software and multimedia.

Skill Literacy -- The ability to use the technology needed to access information resources and knowing the capabilities of a computer.

Resource Literacy -- The ability to understand the form, structure, location and access methods of information resources.

Social-Structural Literacy -- Knowledge of how information is produced and published.

Research Literacy -- The ability to understand and use information technology tools to carry on research and scholarship

Publishing Literacy -- The ability to produce a text or multimedia report to communicate information and the results of research and scholarship.

Emerging Technology Literacy -- The ability to understand innovations in information technology and to make intelligent decisions about the applications of those technologies to an individual's scholarship.

Critical Literacy -- The ability to evaluate the benefits and costs of implementing information technologies.

Information literacy is more than a narrow cognitive skill. It is a set of social practices which requires a variety of resources, including physical artifacts (books, computers, telephone lines, satellites, etc); relevant content transmitted using those artifacts; skills to use and evaluate the content; knowledge and attitude; and community support (Warschauer 2002).

What has Been Holding us Back?

While the lack of infrastructure has held many areas back, the notion that there are absolute haves and have-nots is misleading. Cisler (2000) thinks that there is a gradation based on different degrees of access to information technology. Compare the scientist with broadband access to her desktop, the scientist with a computer hooked up to a 56K modem, the scientist who has access two hours a day to the departmental computer, and the scientist with no computer access but a network of friends throughout the world who print and send him information from the Internet. All can be said to have access to the information on the Internet, but to widely varying degrees. Even within the most developed countries there are inequities of access.

U.N. Secretary Genearl Kofi Annan reported that the Internet is used by only 5% of the world's population and that some 85% of all uses and 90% of all hosts are in developed countries (Conhaim 2001). The lack of local language content and context have had an impact on use of technology even in areas where the technology has been accessible. With over 7,000 languages in the world, in 1997 over 90% of web pages were in English (82.3%), German (4.0%), Japanese (1.6%), French (1.5%), and Spanish (1.1%) (Anon 1997). The majority of Internet users are in the United States, Japan, China, the United Kingdom, Germany, South Korea, Canada and Italy (Aneki.com).

Fear of technology and fear of change have also been large contributing factors, which in turn has lead to an increased isolation of those who are not information literate. While some think this will change as technology is introduced and integrated into different cultures, this would become a several-generation undertaking.

What do our Scientists, Researchers, Students Need?

Many of our users still need infrastructure. In many areas there is little infrastructure to build on. Some think this may be an advantage which allows for the incorporation of new technologies that are not dependent on the existing systems. This concept, "technological leapfrogging," means that the next-generation technology is implemented rather than trying to improve the current, sometimes outdated technology currently in place (Vowler 2002).

They need financial support to obtain and update the equipment and software, to retain qualified professionals to work on the equipment, to train professionals on the methods of information research, and to subscribe to information resources. Many initiatives start out with the best of intentions to implement technology to strengthen the research capacity but lack sustainability. All institutions face the challenge of maintaining and advancing the technology they have.

Equally, if not more important, our users need to be independent users of computers to accomplish their day-to-day tasks. They should not have to rely on librarians for instruction on how to find appropriate information with the computer or with the information technology staff for basic assistance when things go wrong with the technology.

We may want to provide the most up-to-date technologies and a wide range of information resources. As information professionals we need to keep in mind that the level of technology needed is not a universal standard. Many users don't want to be at the "bleeding edge" of technology and can use lower levels of technology to meet their needs. .

What Should Success Look Like?

First, there will be widespread access to network connectivity, including bandwidth, software and hardware, at affordable rates. Policies and regulations will be in place supporting eStrategies in all countries. Expert local people will be able to handle equipment and new technology (Rodriguez 2001). Equipment will be affordable by the average institution. In 2000 in Bangladesh it took 96 months of the average worker's salary to purchase a computer, while in North America it took only one month's salary to purchase the same equipment (Rodriquez 2001). Consistent power sources will be available. This includes alternate power sources such as solar power cells.

Second, information technology training will be an integral part of the education and continuing education process. We will have interesting programs that teach those who think they already know all about information access and dissemination, as well as those who are marginally information literate.

Third, local content and applications will be developed and widely available among countries, through initiatives such as the Open Knowledge Network and the SIDSNet (Small Island Developing States Net). Initiatives should be driven by the demand for information and the desire to share information. Content should meet local needs first. Initiatives need to be sensitive to local conditions and limitations. (Digital Opportunity Initiative) Dr Gro Harlem Brundtland, WHO Director General observed that through the Health Internetwork project, researchers and scientists will begin to "read the same journals, search the same databases, join in the same discussion groups, compete for the same grants; it will bring them into the international community of researchers and eventually improve the dissemination of their own results"

Fourth, online communities will flourish regardless of location or language. Increased communication will facilitate coordinated research activities, sharing of information and data, and sharing of experience to the benefit of science.

Fifth, our users will understand that research is a process, not just a few keystrokes on the Internet search engine.

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FURTHER READINGS

Beagle, Donald. Extending the information commons: From instructional testbed to Internet2. *Journal of Academic Librarianship* 28(5):287-96.

    Discusses the role and development of the information commons and the possible impacts of Internet2.

Bundy, Alan. 2001. *A Window of Opportunity: Libraries And Learning in The 21st Century.* University of South Australia Library. [Online]. Available: http://www.library.unisa.edu.au/papers/window.htm [Accessed: 3/12/03].

    This paper was presented at the Australian Library and Information Association Distance Education Special Interest Group Conference 'Flexible Learning - the new paradigm' Monash University, Gippsland 13-14 February 2000. This paper emphasizes the role of the librarian, discusses the role libraries play in distance education and urges the profession to be proactive toward service to patrons. Filling a need before it arises, has benefits for the patron, the librarian, and is a potential advantage during funding requests.

Carvin, Andy. 2000. More than just access. *Educause Review* 35(6):38-45.

    Suggests that literacy and content problems must be tackled in addition to improving Internet access in order for communities to bridge the digital divide.

Donovan, Ph.D., Mark and Macklin, Scott. 1998. One Size Doesn't Fit All: Designing Scaleable, Client-Centered Support for Technology in Teaching. IN: *CAUSE 98: The Networked Academy*, An EDUCAUSE Conference on Information Technology in Higher Education, December 8-11, 1998, Washington State Convention & Trade Center, Seattle, Washington. [Online]. Available: http://www.educause.edu/asp/doclib/abstract.asp?id=cnc9846 [Accessed: 3/12/03].

    A good example of how one large university, University of Washington, is organized and provides technology in teaching and learning. This paper discusses why they decided against adopting an all-in-one courseware product in favor of adopting a strategy for supporting educators. Lessons learned from the Uwired project: 1) The "vision thing" is critical. You need to create the "big picture. 2) Think strategically. 3) Accept uncertainty; embrace experimentation. Accept the fact that you are operating in a highly uncertain environment and that survival and success are predicated on the ability to adapt and change. 4) Collaborate. Often. And include all groups.

Dorman, David. 2002. Can you say 'Sibboleth'? *American Libraries* 33(9):86.

      Discusses the drawbacks and benefits of Internet2, focusing on authentication

Geer, David. 2002. Internet2. *Byte*.

      Gives the organization of Internet2 and details on its deployment.

Hargittai, Eszter. 2002. Second-level digital divide: Differences in people's online skills. *First Monday* 7(4). [Online]. Available: http://firstmonday.org/issues/issue7_4/hargittai/index.html [Accessed: 3/12/03].

      A study based on results of calculating how a number of searchers looked up topics using the Internet. A literacy study to determine the competency of searching the Internet as opposed to whether they used the Internet or not. It also determines how different people use the Internet to get what they want. As more people use the Internet, it becomes more important to know how different people use the Internet and determine their skill level in doing so. There is an assumed link between how well a person searches the Internet and how useful the Internet is to that person.

Hargrove, Thomas, Stempel III, Guido H. 2002. Poll shows 'digital divide' shrinking, Internet use up. *Scripps Howard News Service*. [Online]. Available: http://www.nandotimes.com/technology/v-text/story/496645p-3960 [Accessed: 3/12/03].

      A report of a survey conducted by Scripps Howard News Service and Ohio University. Findings revealed that comparisons between an identical study conducted in 1995, 2001, and 2002 is that more people are using the Internet. The 1995 study revealed that 87 percent of those adults surveyed did not use the Internet and of those who did were mostly under the age of 45. Recent surveys shows that those in households with incomes over $80,000 use the Internet everyday.

Heterick, Jr., Robert, Mingle, James R., and Twigg, Carol A. 1998. *The Public Policy Implications of a Global Learning Infrastructure*. *Educom* 1998, Interuniversity Communications Council, Inc. [Online]. Available: http://www.educause.edu/ir/library/html/nli0005.html [Accessed: 3/12/03].

      The first part provides a vision of a global learning infrastructure and discusses the impact on higher education. The second part discusses the basic questions state policymakers should ask about the role of Information Technology in meeting statewide goals for higher education.

Holmes, Tamara E. 2002. Crossing the digital divide. *Black Enterprise* 32(9):51.

> This article articulates the transition of the definition of the digital divide from counting mere haves from the have-nots to qualifying the need for "training, awareness, and helping African Americans make their lives more meaningful through the use of technology."

Joo-Young Jung; Jack Linchuan Qiu; Yong-Chan Kim. 2001. Internet connectedness and inequality: Beyond the 'divide'. *Communication Research* 28(4):507-535.

> ICI measures defined. Measurable categories: Home computer history, Task scope, Site scope, Goal scope, Activity scope, Time spent on interactive online activities, Evaluation of how the Internet affects personal life is assessed, Computer dependency relations, and Internet dependency. Each category has a question, the results are weighted and calculated to give a score range of 1 to 12.

Kryder, LeeAnne G. 1999. Integrating computer literacy: Why and what can be done. *Business Communication Quarterly* 2(2):81-6.

> This article points out the value in a business communication course of teaching critical thinking, evaluating the media, visual literacy, and collaborative writing. It is pointed out here that the author had no support from the administration to obtain computer literacy. She purchased her own computer and self-taught herself much of what she learned. With the help of computer literate students in each class, the values were taught.

McFarlane, Angela. 2002. Measuring the digital divide. *Times Education Supplement* 4498:21.

> Discusses the role of academic institutions in promoting the use of digital technology. Looks at the digital divide in Great Britain.

Monroy, Tom. 2002. Cluelessness: The other digital divide. *Inter@active Week* 7(12):96.

> Looks at problem of limited computer literacy, despite the large number of computer users. Tries to define computer literacy.

Oder, Norman. 2002. Benton: Feds retreat from fighting the digital divide. *Library Journal* 127(4)16.

> A news article reporting that the digital divide is closed sufficiently to lower support by the federal government. This judgment is being made due to the perception that half of people of the United States have access to the Internet. But at the same time, it is admitted that 75 percent of the poorest Americans do not use the Internet. The rate of increase of computer and Internet use among minorities and the poor is higher than those with annual incomes of 75,000 or more. At this time though, the base of the larger increase is much lower than the base of the high income group. A budget proposal of the Bush administration is to cut $100 million from two programs: Technology Opportunities Program, which had given grants to local non-profit groups, and the Community Technology Centers program of the Department of Education.

Simco, Greg. 2002. "Extending the Internet 2 domain". *The Internet and Higher Education*, 5: 67-70.

> Extending Internet 2 to libraries, museums, community colleges, universities, and K-12 will deepen information resources and increase collaboration among these entities.

Steinmueller, W. Edward. 2001. "ICTs and the possibilities for leapfrogging by developing countries", *International Labour Review* 140(2):193-211.

> Looks a problems and opportunities of technological 'leapfrogging' in the production and use of information technology in developing countries.

Van Horn, Royal. 2002. Internet2 and the K20 Initiative. *Phi Delta Kappan* 83(6):481-2.

> Gives the background of the K20 Initiative, goals of Internet2, and ways to participate.

WEB SITES TO MONITOR

Benton Foundation. http://www.benton.org

> "The Benton Foundation seeks to articulate a public interest vision for the digital age and to demonstrate the value of communications for solving social problems."

Bridges.org. http://www.bridges.org

> "Bridges.org is an international non-profit organisation with a mission to help people in developing countries use information and communications technology (ICT) to improve their lives." Discusses the problem of "real access." Contains links to online training materials

Digital Opportunity Channel. http://www.digitalopportunity.org

> A joint venture of One World.net and the Digital Divide Network. Provides news items of interest, success stories from developing countries, a good guide to the digital divide and the issue, and funding sources. Can be browsed by topic or country/region.

Digital Divide Network. http://www.digitaldividenetwork.org/content/sections/index.cfm

> Provides "knowledge to help everybody succeed in the digital age." Good sections on Digital Divide Basics, Literacy and Learning, and International Issues.

Internet2. http://www.internet2.org/

> Site for the most current information on Internet2.

Kite, Inc. URL: http://www.kiteinc.org/

> "Keys to Information, Technology and Education is a nonprofit organization addressing the global digital divide by offering free, customized computer packages and technical training to community groups in the 'Third World.' Our commitment to using free software/open source software makes us unique among organizations working in this field." An article by Laura Fokkena provides a case for using open source software in the third world.