

Digital Libraries and Development for the Illiterate

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INTRODUCTION: A DIVIDED WORLD

Even though the information revolution is usually traced back to the 1960s in the United States with the convergence of ICT, it was only in the last two decades that these technologies diffused to most developing societies around the globe, allowing interactive and simultaneous transfer of information in real time. And it was not until the mid-1990s that the Internet became a worldwide phenomenon.

Despite rapid technological changes, in the early 1990s, more than 1 billion people, one-fifth of the world's population, still lived on less than one dollar a day—a standard that Western Europe and the United States attained 200 years ago (World Bank, 1991). Technological progress and social progress had not been a reality for the majority of the population in the developing world. The rate of progress in technological development was in sharp contrast to the rate of progress of social development. By 1999, nearly 1.3 billion people still lived on less than a dollar a day, and close to 1 billion could not meet their basic consumption requirements (UN, 1999). Three decades after the “widening gap between developed and the developing countries” was recognized by the United Nations as the “central problem of our times,” the income gap between the world's richest fifth and poorest fifth had more than doubled, to 74 to one (UN, 1999).

In the early 1990s, digital information technologies were being hailed as the technologies that would transform developing economies. On the production side, it seemed like the developing world could be a player: software was being developed in places like Bangalore in India, and computer chips were manufactured by Costa Rica for Intel. As barriers to connectivity diminished, the prospectus that information technologies would assist in fighting poverty was bright. By the end of the decade, revenue generated by the production of information and communication technology (ICT) goods (like office equipment, telecommunications, and consumer audiovisuals) showed the United States as the absolute leader in the world (OECD, 2000a). In 1997, the OECD reported that even though industrialized countries accounted for more than 80% of the world market for ICTs, expenditures in non-OECD countries such as Brazil and China had been

growing at more than double the OECD average (OECD, 1997).

Furthermore, the 1998/1999 World Bank Report included many examples of how ICTs were making a difference in the developing world. In spite of these trends and many more examples, both the UN and the World Bank acknowledged the existence of a “divide”:

- Geographic barriers may have fallen for communications, but a new barrier has emerged, an invisible barrier that is like the World Wide Web, embracing the connected and silently—almost imperceptibly—excluding the rest. (UN, 1999, p. 1)
- If knowledge gaps widen, the world will be split even further, not just by disparities in capital and other resources, but by the disparity of knowledge. Increasingly, capital and other resources will flow to those countries with the stronger knowledge bases, reinforcing inequality. There is also the danger of widening knowledge gaps within countries, especially developing ones, where a few fortunate surf the World Wide Web while others remain illiterate. (World Bank, 1998, p. 14)

As Arunachalam (1998) says, the Internet “is failing the developing world.” The term “digital divide” was coined during policy discussions held for the U.S. Telecommunications Act of 1996, which was designed to ensure every American eventual access to advanced telecommunications services and more immediate access to basic telephone service. Since then, the term has broadened and been defined as differences in access to all digital information and telecommunications technologies, including the Internet. More recent definitions focus on describing the divide itself, by, for example, classifying it into several divides:

The digital divide is a multidimensional phenomenon encompassing three distinct aspects. The global divide refers to the divergence of Internet access between industrialized and developing societies. The social divide concerns the gap between information rich and poor in each nation. And lastly within the online community, the

democratic divide signifies the difference between those who do, and do not, use the panoply of digital resources to engage, mobilize and participate in public life. (Norris, 2001, p. 1)

Other definitions, such as the following, focus on describing the effects created by the divide (or divides):

The digital divide refers to social stratification due to unequal ability to access, adapt, and create knowledge via use of information and communication technologies. (Warschauer, unpublished manuscript, 2001, p. 1)

Several characteristics stand out from these two definitions. First, the global digital divide is not simply the difference between countries with or without access to the Internet. Second, in spite of being caused by the use of digital ICTs, the divide is not binary, rather it is a complex social multidimensional phenomenon created by the access, or lack of access, to these technologies. Third, from a global perspective, the divide may be deepening prevailing differences between developed (postindustrial) and developing countries. For our purposes, the global digital divide is defined as the gap established due to unequal capacity among countries to access, adapt, and create knowledge via the use of digital ICTs. The global digital divide may be exacerbating differences among countries, but also within countries. In sum, when referring to the global digital divide, we are referring to the digital divide among countries, whereas the social digital divide is the social stratification created by the digital divide within a country.

This phenomena added new questions to the development puzzle: In what way is the global digital divide affecting the quality of life of individuals in the developing world? Had the exponential pace of ICTs mainly served to benefit the postindustrial countries? Or had it created opportunities for “leap-frogging” development stages for developing countries? If there was such a thing as a “digital divide,” was it expanding or was it closing?

DIGITAL LIBRARIES

Inequalities among countries due to differences in their capacities to access information and knowledge have always existed. Whereas in 1998, a U.S. medical library subscribed on average to about 5,000 journals, the Nairobi University Medical School Library, long regarded as a flagship center in East Africa, received only 20 journals (compared with 300 a decade ago). In Brazzaville, Congo, the university had only 40 medical books and a dozen journals, all from before 1993, and the library in a large

district hospital was a single bookshelf filled mostly with novels (UN, 1999).

The new component in the already unequal capacity among countries to access knowledge is the new type of digital infrastructure required to increase a country's capacity to access knowledge. The infrastructure required to bridge the divide created by differences in access to knowledge and information in the developing world is a whole set of complementary digital and nondigital infrastructures that enable storing, processing, and communicating information and knowledge in new ways. Broadly speaking, the complementary set of infrastructures otherwise known as the infostructure include an underlying electrical and telephonic grid, national core computing and capacity (for example, personal computers and Internet hosts), and access to online subscriptions and digital libraries (DLs).

DLs software provides a convenient way of organizing information and making it available over the Internet (Witten et al., 2000). A *collection* of information comprises several (typically several thousand, or several million) documents. A *document*, in turn, is any information-bearing message in electronically recorded form. Documents are the fundamental unit from which information collections are built, although they may have their own substructure and associated files. Documents generally comprise text, though they may be images, sound files, or video. A collection may contain many different types of documents. Each collection provides a uniform interface through which all documents in it can be accessed—although the way that documents are displayed will depend on their medium and format. A *library* generally includes many different collections, each organized differently—though there is a strong family resemblance in how collections are presented.

Making information available using this system is far more than just “putting it on the Web.” The DLs software allows the collection to become maintainable, searchable, and browsable. Prior to presentation, each collection undergoes a “building” process that, once established, is completely automatic. This process creates all the structures that are used at run-time for accessing the collection. Searching is based on various indexes involving full text and metadata. Browsing is based on various metadata and on phrase structures, and other information, abstracted from the full text of the documents. Support structures for both are created during the building operation. When new material appears, it can be fully incorporated into the collection by rebuilding.

Over the past several years, Tulane University's Payson Center has collaborated in the creation and distribution of several CD-ROM DLs using Greenstone software in conjunction with the Human Info NGO. This

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