Digital Divide in Scholarly Communication   **D**

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INTRODUCTION

While the digital divide refers to differences in access, use or knowledge of technologies in general, the digital divide in scholarly communication refers to the different magnitude of access, intensity of use, and level of contributions to scholarly communication that occurs in an electronic format within the academic community. These differences emerge, according to Chinn and Fairlie (2004), Galperin (2010), and Hilbert (2011) because of varying levels of access to technology, different motivations to use and contribute to the scholarly literature, and different research methods and technical skills by the scholars who are simultaneously both authors and readers of research. While on any number of ethical principles the unequal distribution of access and use of information and communication technology (ICT) is unjustifiable, the digital divide as it specifically applies to the academic community is both ethically unjustifiable and economically damaging. The differences in access to and use of technology by those in the academic community, as described in Guillen and Suarez (2005) and Hilbert (2011), translate into economic growth differences due to the strong relationship that exists between research and development (a process that relies on access to and use of scholarly communication) and economic growth and development.

BACKGROUND

Any discussion of a digital divide as it applies to scholarly communication specifically requires first a discussion of a digital divide more generally. A digital divide has been discussed since 1999 and refers to unequal access to technology with Norris (2001) providing a review of the early discussion of the divide. This divide is thought to exist largely because of economic differences. Less economic prosperity within a country translates into less technology per person and less of an incentive or motivation by individuals to use it. This divide can exist both within a country and across countries. Within a country the divide can exist between urban and rural regions, between different sectors of the economy, and between different income brackets. These same differences can exist across countries with the divide particularly pronounced between developed and developing countries. From Hilbert (2011) we then see that the digital divide then becomes conceptualized in terms of who is connecting to an ICT, the characteristics of those who are connecting to an ICT, the specific kind of technology used, how intense or sophisticated the use is of the ICT, and the motivations behind why an individual would make use or not make use of an ICT.

DiMaggio et. al (2004), van Dijk (2005), and Hargittai and Hsieh (2013) highlight the difference between the terms 'digital divide' and 'digital inequality.' The digital divide term refers to a statistical and formal analysis of those who have access to an ICT. The digital inequality term refers to the difference in benefit received from the use of an ICT. Eliminating the digital divide through changes in policy and investments in technology may perpetuate and aggrandize inequality if the changes are unequally applied to the various communities in a society. Despite the progress made in expanding access to technology, both a digital divide and digital inequality continues to exist across and within countries.

The fact that technology has gotten less expensive means that more individuals are able to obtain it. This fact has led some such as Galperin (2010) to focus on how individuals are connecting to an ICT. The use of ICTs are associated with higher productivity levels, greater educational attainment, and the linking of rural to urban areas. When the focus is on use, attention then turns to whether policy makers recognize the consequences of their regulations.

In the next section I focus primarily on the digital divide as it specifically exists between academics in

different countries with a secondary focus on the digital inequality that exists within a country. The differing levels of access and use of ICTs among academics in turn contributes to and perpetuates economic development differences across countries.

The Digital Divide as Applied to Scholarly Communities

The digital divide in scholarly communication refers to the different magnitude of access, use, and level of contributions by academic researchers to scholarly journals, books, and databases that are either solely electronic or available in both a print and electronic format. The earliest focus of researchers was less about the digital divide itself as experienced by academics and more about the opportunities that can come from extending to academic researchers access to digital tools. Most prominent in this early literature was Stevan Harnad, Ann Okerson, and Andrew Odlyzko. Their research was centered around how to increase access to and reduce the cost of scholarship by bypassing institutions such as journal publishers that previously served as roadblocks to accessing and contributing to the scholarly literature.

The Digital Divide as Perpetuated by Finances

The largest roadblock to the use of the scholarly literature was initially seen as financial. The claim was that electronic methods of scholarly communication made the scholarly communication process more efficient by reducing production costs. A more cost efficient scholarly communication process improves access to readers and opportunities for publication for authors. The research question was how much savings resulted from converting to an electronic format. Harnad (2003) estimated up to 70% savings were realized when the publisher adopted electronic methods whereas Tenopir and King (2000) estimated savings of less than 30%. The majority of researchers sided with Harnad and believed that abandoning print could reduce distribution costs and in so doing enhance access and help bridge the digital divide. Electronic methods of producing scholarship is seen as one way of generating some cost savings. Another source of cost savings come from con-

sidering alternative methods of distribution. Instead of having peer reviewed research distributed only through journals, an ICT made possible preprint services and institutional archives. Preprint services and institutional archives rely on the fact that academic researchers are reluctant to abandon the traditional scholarly communication system and as they produce research for this model, they receive from the publisher an edited and accepted manuscript that they can personally upload to a preprint or institutional served that distributes the research at no cost to the reader. Governments and major research funding agencies have supported this alternative method of distributing scholarship by requiring researchers receiving funding to post preprints or postprints of their published research.

With new methods of distributing and accessing scholarly literature there have also emerged new methods to pay for it. Bakos and Brynjolfson (2000) among others focused on the new pricing models that are possible when scholarship was distributed electronically. Instead of having access paid for primarily by the reader through his or her institutional library, electronic methods of distribution permit expanded use of pricing mechanisms where authors provide the needed funding. Publishers in the electronic era have also adjusted their pricing strategies and have encouraged libraries to purchase access with site licenses to bundles of journals. The discussion of alternative pricing mechanisms have also given rise to alternative formats such as the open access journal where readers receive access at little to no cost and most expenses are covered by the author and the author's research funding agency.

The Digital Divide Between Academics in Developed and Developing Countries

The research focus on how best to organize the distribution of research and finance it are largely the concern of those in developed countries. Today, the digital divide in scholarly communication in the developed world is largely discussed as if it has been bridged. A reflection of this is found in the 2008 report of the Association of Research Libraries (ARL) titled "Current Models of Digital Scholarly Communication." In this report an optimistic tone is present with preprints, working papers, blogs, discussion forums, and reviews seen

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