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Challenges in HCI : Digital Divide

by [Kibum Kim](#)

Introduction

Adopted by the ACM Council in 1992, the ACM Code of Ethics and Professional Conduct focuses on issues involving the *Digital Divide* that could prevent certain categories of people — those from low income households, senior citizens, single-parent children, the undereducated, minorities, and residents of rural areas — from receiving adequate access to the wide variety of resources offered by computer technology. This Code of Ethics positions the use of computers as a fundamental ethical consideration: "In a fair society, all individuals would have equal opportunity to participate in, or benefit from, the use of computer resources regardless of race, sex, religion, age, disability, national origin, or other similar factors." This article summarizes the digital divide in its various forms, and analyzes reasons for the growing inequality in people's access to Internet services. It also describes how society can bridge the *Digital Divide*: the serious social gap between information "haves" and "have-nots."

The Digital Divide

The term "Digital Divide" refers to unequal access to electronic resources, and it is now one of America's leading economic and civil rights issues [18]. The original concept of the digital divide was propounded by political leaders, such as Jesse Jackson, who noted pervasive differences in computer and Internet use among the following groups: fully industrialized and less-industrialized countries, people of different socioeconomic statuses (education, income, occupation, wealth), people at different life stages, men and women, and different local areas and regions [1]. These groups follow predictable patterns of further excluding the already marginalized (e.g., older, poorer, rural people

in less-industrialized countries have almost not access). In the later years of the Clinton administration, the digital divide broadened beyond US borders to embrace the globe. In 1999, a G8 economic summit meeting decided that the growing gap in information technology was one of the most serious problems hampering development in the Third World [2].

The explosion of the Internet is a momentous event in human history that has totally transformed the means by which we communicate and share ideas. As a broadcast, information dissemination, and collaborative medium, the Internet has redefined our perception of time and space. While the number of Americans connected to the nation's information infrastructure is soaring, a digital divide still exists, and, in many cases, is in fact widening over time. For example, while well-to-do White Americans with Internet access has grown to 82%, the less well-off African-Americans are far less wired (25%) [19]. As the technical capacity and content of the Internet continues to grow exponentially, closing the digital divide becomes increasingly critical to economic success and personal advancement.

According to the Pew Internet & American Life Project [5], half of the adults in America do not have Internet access, and 57% of those non-users are not interested in getting online. Most of the strongest Internet holdouts are older Americans, who are fretful about the online world and often don't believe it can bring them any benefits. Roughly 87% of those aged 65 and over do not have Internet access. Also, there is notably less Internet penetration in rural areas than in other types of communities. In rural areas, as a whole, 57% of residents do not have access to the Internet, compared to 47% of those in urban areas and 46% of those in suburban areas. Others who do not routinely use the Internet point to reasons other than prohibitive cost and difficult access, the factors most commonly cited for lack of use. In fact, a significant number of non-users avoid the Internet either because they believe it is a dangerous thing (54%), or because they do not think they are missing anything by staying away from it (51%).

Another aspect of the digital divide involves Americans with disabilities, who have a variety of challenges accessing the Internet. Disabilities that might prevent them from having equal access include visual disabilities, hearing disabilities, learning/cognitive disabilities, physical/motor disabilities, and seizure disorders. In 2000, 85% of Americans with such disabilities reported not being online [7]. In order to rectify this inequality, in September of that same year, President Clinton launched a federal initiative designed to bridge the digital divide for people with disabilities [8]. A wide

variety of adaptive technologies can make web sites accessible for people with disabilities, but designers do not always use them and the disabled cannot always afford them.

The gap between students who do and do not have access to the Internet at home presents another aspect of the digital divide. Students with better Internet skills possess greater knowledge about how to access and use educational Web sites, and thus have a significant competitive edge over their peers. Students who do not often use the Internet are more reluctant to go online because they do not even have basic keyboarding or computer skills — or, in more extreme cases, because they lack the basic reading and writing skills required by the online world [10].

Beyond American borders, the digital divide is an increasingly serious problem. While rich, developed countries continue to benefit as a result of the proliferation of technology, emerging countries without equal access simply cannot compete or prosper. More than 96% of computers connected to the Internet are found in the wealthiest nations, home to 15% of the world's population. In contrast with US and other Western civilizations, in India, less than 0.5% of the population has Internet access [6]. In Mexico — a nation of close to 100 million — only about one million people have access to computers, and only 10% of those access the Internet. According to the Association for Progressive Communications, Africa accounts for about 13% of the world's population but just 1% of its Internet users [3].

In the following sections, I explore these various digital divides discussed above in detail.

Leavers and Takers

A new form of cultural imperialism is emerging as tribal communities become wired to the Internet. Demmers and O'Neil address the issue of universal access to the Internet in terms of *Leaver* and *Taker* [3]. During the agricultural age, Taker cultures produced more than they needed and imposed their ways upon others while Leaver cultures interacted with their environment in a sustainable manner, not producing more than they needed, rapidly expanding their population, or imposing their way on others. The Internet — where once it was believed all individuals had an equal voice — has gradually become dominated by Takers.

The Internet now appears to be a winner-take-all market. A study conducted by Xerox

found that five percent of all Web sites received 74.8% of all web traffic, a discovery that refutes the claim that the web is a great equalizer. As content on the Internet becomes redundant and focused toward a particular group, i.e. Takers, the Internet is in danger of losing its effectiveness as a communication tool. With predominantly Taker content, the Internet is susceptible to the ills inherent in a culture dominated by a single group [3].

There are three motivations for Leaver communities to present themselves in the global Internet while it is beneficial for the whole of the online community: 1) multiple perspectives benefit all, 2) Taker cognizance of Leaver concerns, and 3) the need to prevent anomie.

Leaver cultures should be encouraged to join the online community because multiple perspectives on the same subject tend to benefit all engaged community members. For example, in the OCSS [9] project, students posted their local histories and presented their findings on the Internet, an experiment that enabled both Taker and Leaver cultures to access equally each other's cultural perspectives.

Leaver contents need to be developed and presented on the Web because it increases Taker cognizance of Leaver concerns. An Amazon tribe, for instance, had land returned to them after becoming vocal on the Internet about illegal land encroachments.

The participation of Leaver cultures also prevents an anomie. If the digital divide continues to widen, the First World "Takers" will be looked upon more and more as oppressors and exploiters of the Third World "Leavers."

There are several barriers to Leaver cultures' participation, including language obstacles, distrust based on history, and technological hurdles. To begin with, the majority of material available on the Web is presented in English. A Leaver culture that is willing and able to present its information online *in its own language* may have no audience outside of its immediate community.

Historically, also, Takers have exploited Leavers by taking their resources without returning anything, a situation that over time builds distrust between them. In order to encourage the participation of Leaver cultures in Internet endeavors, attempts must be made to overcome this accumulated distrust. Leaver cultures must be convinced that their involvement is for their own benefit, not solely for that of others.

Finally, basic technological barriers exist: a lack of telecommunications infrastructures in Leaver communities makes it difficult for them to use the Internet. For example, the 314 Native American reservations and trust lands have an average telephone penetration rate of 46.6%, which is less than half the national telephone penetration rate of 94% [20]. Those without telephones lack effectual participation in quickly expanding digital Internet communities.

To break the barriers and encourage Leaver participation, political policies ensuring universal access should be provided. For example, Section 254 of the Telecommunications Act of 1996 expanded the universal service concept from basic telephone service to include access to the Internet for schools, libraries, and health care providers. The other key solution is neoteric interface designs. To communicate with people from extremely disparate cultural background, there must exist a common vehicle for understanding, such as spoken language, hand gestures and facial expressions. Usable and useful interfaces are one way to effectively increase Leaver participation and to use technologies in a manner consistent with their goals - as tools for assisting humankind in its co-existence [3].

Disabilities and the Digital Divide

Of those people with disabilities who are online, 48% say the Internet has significantly improved their quality of life, compared with 27% of those people without disabilities [7]. While a growing number of people with disabilities have various adaptive technologies from simple adaptive devices (screen magnifiers) to advanced computer systems (screen readers), many Web sites are not accessible to large segments of the disability communities, particularly people who are blind, deaf, or hard of hearing. The 2002 survey of the Pew Internet Project revealed just 38% of Americans with disabilities go online, compared to 58% of all Americans [19]. The features that make Web pages, software programs, and multimedia attractive to audiences without disabilities can create problems for people with disabilities. For example, those with physical disabilities may have trouble with interactive virtual reality systems that require walking, reaching, and grasping. Likewise, those with speech disabilities may have trouble with speech recognition systems that require clear speech.

In September 2000, responding to this issue, the Department of Justice directed all federal agencies and contractors to review their respective Web pages and ensure they comply with accessibility standards using Section 508 Self-Evaluation Guidelines [14].

Providing accessibility guidelines, resources, and training for organizations can help ensure that Web sites are accessible to everyone.

The Digital Divide in the Classroom

In addition to the challenges faced by Internet users with disabilities, one must also consider the economic and cultural challenges faced by young people in under served communities who are eager to participate in the information age. Only around 30% of youths in the lowest household income category use computers at home, compared to over 90% of youths in the highest income category [15].

Schools are a place where the digital divide can be highlighted. At East Carolina University, for example, students who possess more significant computing knowledge tend to exhibit more successful communication skills both in traditional and electronic discourses, whereas students without that technology background show significantly lower success in translation of their face-to-face (FTF) communication skills to electronic media. Thus, students with impoverished technological backgrounds, even if they tend to participate in FTF in the traditional classroom, will not use electronic communication effectively as a discourse medium. One can imagine how the combination of computer and communication anxiety influences academic performance for such students [16].

The workable solution for helping technologically impoverished students is to provide more flexible and supportive design approaches for on-line classes: offering a personal touch, relying on group strengths, limiting knowledge demands, providing training, creating simple and redundant designs, and accepting current limitations [16].

The International Digital Divide

Unfortunately, during the last decade, developing nations in Africa, the Middle East, and Central Asia have been cut off from the same basic technological innovations that have brought Internet access to other countries. In fact, the idea of reducing the growing gap in information technology is one of the core problems facing development in the Third World [2].

Such development is vital. Take the example of Nepal, a Least Developed Country (LDC) as classified by the United Nations Development Program (UNDP). This country rises steeply to almost 30,000 feet in the Himalayas and contains eight of the 10 tallest

mountains in the world, including Mt. Everest. Eighty percent of the population is engaged in agriculture and only 15% of Nepalese households have electricity. Nepal is one of many historically poor and geographically isolated countries now looking to information technology as their last, best hope to raise their large populations' standards of living [11].

Not surprisingly, Nepal was a latecomer to the Internet. By January 2000, there were nine operational licensed ISPs servicing 9,000 accounts with perhaps 35,000 users (of the country's roughly 21 million people). One obvious area of local work is in software using the Nepalese language. However, unlike other one-language countries, Nepal suffers from not having a universally spoken language even in its home country. Moreover, the country is beset by a literacy level of only 39%.

The other factor of the digital divide in Nepal is the lack of government support. Nepal's government simply does not have a good record of directly providing IT to the population in any form, including telecommunications, computing, the Internet, or even the mass media. The government does not seem to have the know-how, the people, or the financial resources to bring the benefits of widespread modern IT to the country. Far more attention is given to traditional areas, like agricultural development and the tourist industry.

However, it is possible to narrow the digital divide in Third World countries. New technologies can broaden and enhance digital access in developing nations because they offer relatively cheap, versatile and technically efficient services that complement standard telephony [12]. New technologies such as satellite links, GPS, and wireless communications are now inexpensive enough and so readily available through a large number of commercial and other sources that much can be done to affordably overcome the extreme problems of topography and location at the top of the world [11]. The other necessary condition for closing Nepal's wide digital divides involves the government's will for making it happen, even if that means recognizing it has to adjust some of its privileged positions in the process.

Concluding Remarks

Many of the strongest Internet holdouts often don't believe the Internet can bring them any benefits [5]. Is the Internet unnecessary or a luxurious accessory? Previous Federal Communications Commission Chairman Michael Powell commented, "I think there's a Mercedes divide. I'd like one, but I can't afford it.... I'm not meaning to be

completely flip about this — I think it is an important social issue — but it shouldn't be used to justify the notion of, essentially, the socialization of deployment of the infrastructure"[17].

When it comes to developing countries, we might argue that the digital divide is just a divide. Given the more serious essential issues for the multitudes in the Third World — primary health care, sanitation, adequate nutrition, basic education, poverty, and political corruption — providing them with the means for surfing the Web seems quite meaningless.

However, the Internet is not technically a Mercedes Benz; instead, one must consider it a crucial element of a country's primary infrastructure, like electricity. Digital technology is the key for developing countries to enter the knowledge economy and global cooperation and coordination. The Information Revolution is similar to the Industrial Revolution of the 19th century. If underrepresented groups fail to access digital technology, Third World countries lose an opportunity to participate in the new economy of the 21st century. While the governments of developing countries are attempting to provide their residents with the basic necessities of life, they should be simultaneously providing access to information technology. It is not impossible in developing countries to close the wide digital divide but those authorities in charge of its success might expect to approach it in a different manner than the more advanced countries [11].

The traditional concept of the digital divide has primarily considered divisions between "have" and "have-nots": those who have relatively easy access to computer and Internet services, and those who do not. As technological advances in semiconductor and various computer components are constantly decreasing the cost of a PC and Internet services, financial barriers will not be the main problem for Internet access. Indeed, in the near future, most households will be able to have some form of Internet access, much like today's telephone [17].

However, while virtually everyone can use a telephone, learning the intricacies of a computer and navigating the Internet are skills not so easily accomplished. Computer skills require training. Just as the possession of medical textbooks or knowledge of statutes do not make a person a doctor or a lawyer, providing a computer and Internet access alone will not address the digital divide. Fifty-seven percent of those without Internet access say they do not plan to log on. Many of the Internet "have-nots" are

really "want-nots" [5]. The problem is that they lack the skills to explore the Internet efficiently and therefore see its value. If they can be convinced that the Internet is useful, entertaining, and relatively easy to use, they might be more receptive to the idea of going online.

Therefore, the proximal availability of educational and training programs is not merely important but extremely vital. However, the availability of schooling, training and mentoring is spatially uneven. Unfortunately, poorer and more rural areas — where there is notably less Internet penetration — traditionally have the fewest educational or training programs that could be used for teaching or mentoring. This is a kind of *Double Digital Divide*, segregated by area as well as by individual socioeconomic status [1].

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