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Globalized and Localized Digital Divides Along the Information Highway: A Fragile Synthesis Across Bridges, Ramps, Cloverleaves, and Ladders

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ABSTRACT

The purpose of this paper is to determine whether there is any basis for creating a "synthesis" of the multiple dimensions of what is popularly known as the "Digital Divide" in terms of a series of interlocking ramps, cloverleaves, bridges, and ladders. To borrow an analogy, a number of veins, fault lines, cracks, or dimensions, such as income, education, occupation, labour, age, gender, race and ethnicity, and nation, run through the Information Highway, fracturing it into unequal parts, called the "Digital Haves" and the "Digital Have-Nots". Can the beginnings of a synthesis be constructed by building lateral bridges, ramps, and cloverleaves between these dimensions, and vertical ladders between the "Haves" and "Have-Nots"? Like ladders and bridges, some of the links will be linear, direct and simple; but like ramps and cloverleaves, other links will be curvilinear, indirect, and complex, requiring loops and feedbacks among the dimensions for a complete understanding of the Divide. Given the deep fissures in the local, regional, national, and global Information Highway, we will not attain a complete synthesis. Hopefully I will be able to erect some signposts pointing to the paths necessary for building a more unitary conceptualization of the social, economic, and political infrastructure of the Digital Divide.

ABOUT THE AUTHOR

Dr. Carl Cuneo is a Professor in the Department of Sociology at McMaster University and the National Director of EvNet: Network for the Evaluation of Educational and Training Technologies. He has a Ph.D. from the University of Waterloo. His groundbreaking work on the Canadian class structure, social inequality, trade unionism, and the relations between new technologies and learning has been published in more than thirty articles in leading journals, books, and on-line sites. He is also the author of *Pay Equity: The Labour-Feminist Challenge,* published by Oxford University Press. More recent publications and scholarly work are related to the development of computer technology. The recipient of several major research grants from SSHRC as well as other major funding agencies including Industry Canada and the Council of Ministers of Education Canada, Dr. Cuneo recently has been engaged in innovative research and collaborative projects related to the implementation and evaluation of technology-based learning. His Contributions have been acknowledged in several awards, including the National Blizzard Award for Collaborative Teaching. He is highly regarded by academic, policy and public bodies as a speaker and media commentator.

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Introduction

There has been a tendency, especially in North America and Europe, and among technology enthusiasts and some educators, to assume that the whole world is connected to the Internet, and surfs the World Wide Web. Why would we use the term, 'World Wide Web', if we were not talking about a global phenomenon? However, Internet statistics show that only about 6-8% of the world's six billion population is connected to the Internet. Approximately 92% of the world is NOT connected to, nor uses, the Internet.[1] The erroneous assumption of universal connectivity is not simply a statistical mistake. Governments, corporations, community organizations, and individuals make many incorrect decisions, with sometimes dramatic and far-reaching consequences, on the basis of the assumption that most of the world is connected to the Internet. Not only is the vast majority of the world not connected to the Internet, most people do not even have the computers, skills, experience, interest, or awareness to become connected. The disconnected are not randomly distributed, but have specific demographic, social, economic, racial, ethnic, gender, gerontological, and political characteristics that amount to a systematic bias of exclusion, often referred to as the "Digital Have-Nots". Similarly, the connected are not randomly distributed, but possess particular demographic, social, economic and political characteristics making up what has become known as the "Digital Haves". The separation, chasm, abyss, canyon, gulf, or distance between the "Digital Haves" and "Digital Have-Nots" has become known as the "Digital Divide."

What is "digital" in the "digital divide"? The origin of digital is the Latin word *"digitalis"*, meaning "of or relating to the finger or toes," or "done with the finger" (circa 1656) (Merriam-Webster Dictionary). The adjective "digitate" means, "having divisions arranged like those of a bird's foot". "Digital" is equivalent to a "a unit of length based on the breadth of a finger and equal in English measure to 3/4 inch." Historically, "digital" stands for "any of the Arabic numerals 1 to 9 and usually the symbol 0, or one of the elements that combine to form numbers in a system other than the decimal system." "Digital" is "using calculation by numerical methods, or by discrete units". In modern computer and television parlance, "digital is better than analog". It is more efficient and allows a greater standardization and speed in the transmission of data, images, and text, that are converted to ones and zeros (encoding), transmitted as packets across the Internet, and then reassembled as text, images and data on the receiving end (decoding). In the world of television, digital reception is higher quality and more efficient than analog reception. Although beyond the bounds of this paper, there is a set of cultural assumptions dealing with binary ones and zeros and "finger- pointing." Some cultures oppose, or at least do not communicate via, binary ones and zeros and finger gestures. This implies greater ideological resistance to the Internet by some cultures than by other cultures. It is somewhat ironic that the Internet is based on a numeric system created in a part of the world (Arabia) that has weak design decisions over its content and infrastructure, and comparatively few Internet consumers. Traditional Islamic cultural beliefs also actively oppose Westernization and Anglicization via the Internet, regardless of mass commercialization and sexual customs via the Internet.

What is "divide" in the "digital divide"? There are many definitions and usages of the "digital divide" in the literature. However, they all have in common the notion of a chasm, gulf,

dichotomy, or separation between two entities. Those entities vary considerably. The Cultural Access Group, a cultural market research and consulting firm in Los Angeles, USA, defines the "digital divide" as the "underutilization of computers and the Internet by people of disadvantaged socio-economic backgrounds who, for various reasons, are disconnected from technology resources. These digital divisions are observed along income and educational levels, race and ethnicity, gender, age, and even geography." (2001b: 7). This implies a multiplicity of fragmented divides. The relations, or ramps, bridges, and ladders connecting them are not clear. There is no implied system or synthesis among these multiple divides.

Paul DiMaggio and his colleagues, in a recent review of sociological research on the Internet, define the "digital divide" as "inequalities in access to the Internet, extent of use, knowledge of search strategies, quality of technical connections and social support, ability to evaluate the quality of information, and diversity of uses." (2001: 310). This definition appears to go far beyond the previous definition. First, it does not posit a polarization or a divide between those who have Internet access and those who do not. Second, it goes beyond the issue of access to that of skills in the use, not only of the technology, but also of the information and knowledge transmitted through the technology. Third, it restricts the "digital" to the Internet only. It excludes computers not connected to the Internet, or activity not on the Internet, such as word-processing, accounting with spreadsheet software, statistical analyses on stand-alone computers, etc. Fourth, it includes a realm that can be see quite apart from the Internet; that is, the critical evaluation of information. Information evaluation should be the same, regardless of whether that information is transmitted across the Internet or through hardcopy publications. It is true that some evaluation deals with the design of information on web sites. But the evaluation of information *qua information* is not dependent on a particular medium of transmission. Finally, some research shows that when minorities do access the Internet, they tend to be more frequent users than majority groups. It is not clear how one characterizes this situation in terms of a digital divide. I continue to be fascinated by the minority of highly educated and high-income earners who are not connected to the Internet, even though most of their colleagues spend many hours per week on the Internet; and, the minority of less educated, low-income visible minority users who are connected to, and are avid users of, the Internet. These situations present challenges to the viability and the integrity of the concept of the digital divide. Atwell also suggests there is a second digital divide: what people do with computers once they gain access to them. He suggests at this level there is a second kind of inequality. For example, working class kids are more likely to play games, and less likely to pursue educational goals, on home computers than upper class kids (Atwell, 2001). Riddell, Boucher, and Groseilliers (2000) suggests not one, but three digital have-nots: those with an interest in the Internet and a desire to participate, but face barriers in terms of costs and skills; those who face cost and skill barriers, and have little desire or interest in participating; and, those who are so far removed socially that there is little awareness of the Internet (such as seniors).

There has been a tendency in the literature to take a one-dimensional approach to the digital divide. Demographers view the digital divide in terms of a population count, or a census of Internet users versus non-users. Geographers look at the digital divide in terms of space and location: How does country and residential location affect Internet access? The developed North and West are often viewed as the digital haves; the undeveloped South as the digital have-nots. Engineers view the digital divide as a technological challenge: How does one

construct sufficient bandwidth to handle millions of users online, all sending messages through narrow pipelines at the same time? The digital haves are high-bandwidth; the digital have-nots are low or no bandwidth (the disconnected, unconnected, or unwired) (Wresch, 1996). Political scientists view the digital divide in terms of those who rule and those who are ruled, or more generally the process of democratic participation in society. Who rules the Internet? Who is ruled by the Internet, both online and offline? Economists view the digital divide in terms of income, wealth, and poverty, as well as the capacity of companies to generate a profit by selling goods electronically across the Internet. The digital haves are the wealthy and the dot.com companies that sell virtually across the Internet; the digital have-nots are the impoverished, or those who do not purchase online. Sociologists view the digital divide in terms of inequality of access by socio-economic status, social class, ethnicity and race. The digital haves are the upper and professional middle classes, and the white majority, at least in developed Western countries; the digital have-nots are the lower-middle and lower classes, and visible ethnic minorities. Educators see the digital divide as a challenge to be overcome so that they can sell courses globally in distance education arrangements. The digital haves are the pure online students, taking their degrees totally by distance, with all the bells and whistles that distance education provides; the digital have-nots are students who take face-to-face instruction with no online support. Feminists see the digital divide as yet another exclusion of women from equal opportunities with men: the digital haves are privileged men; the digital have-nots are unprivileged women.

None of these views by themselves give us a complete understanding of the digital divide. In fact, each dimension by itself is somewhat simplistic, providing a distorted view of the digital divide. There is even competition among academic and political groups as to which dimension is more important, or which is more primary. Much of the international literature prioritizes the geographic/engineering view, expressing a contrast between the developed North and Western world versus the impoverished underdeveloped or developing South (e.g., Wresch, 1996). Feminists emphasize gender, political scientists stress democracy and political rule; economists focus on markets and e-commerce, sociologists zero in on class and ethnicity/race, and gerontologists stress aging. Yet each view has something to contribute to an overall comprehension of this important phenomenon of the 21st Century. If Pitirim Sorokin were alive today, he would be seeking ways to integrate these fragmented dimensions into an overall conceptual system, perhaps with some law-like principles governing the Digital Divide. The purpose of this paper is to try to begin to integrate such fragmented dimensions into an overall understanding of the digital divide, or at least to build some bridges, ramps, cloverleaves, and ladders among the dimensions.

First, I would like to first make five preliminary and qualifying remarks.

Social Relations of Technology

Engineers may look at technology through the lens of chips, disks, wires, fiber-optic cables, Ethernet cards, and connectors. Computer scientists and programmers may view technology as thousands of lines of software code. In this paper, we are looking at technology in terms of the social relations in which it is embedded. This is nothing new. Commentators, all the way from Karl Marx (1967) to Sherry Turkle (1995), have noted that technology consists of social relations among people and organizations. This is especially the case for networked computers,

which allows for a networking of people. The large research field of Computer- Mediated Communications (CMC) is really about the communications among people using the computer as a tool. In the study of work, this has led to research on Computer-Supported Collaborative Work (CSCW), and in education to research on Computer-Supported Collaborative Learning (CSCL). From this perspective, the computer is not an inert mass of cables, chips, microprocessors, Ram, and hard and floppy disks. Rather, there are four types of social relations implicated in technology: (a) There are social relations embedded in the production of computer hardware, software, peripherals, and applications. The social relations of work, gender, social class, race and ethnicity, and community that go into the production and distribution of the computer and Internet lie hidden and invisible to the naked eye (the transparency of technology). This is a kind of embedded digital divide; it is the digital divide within the digital divide. (b) Technology users are engaged in social relations as they communicate with one another through the computer. This is the most obvious, direct, and simple meaning of the "Internet". It has led to a hot debate over the "reality" of "virtual communities". (c) There is a whole area of policy-making concerning technologies. Every major western country has set up government task forces on its national Information Highway or Internet grid. (d) Technology in general, and computers and the Internet in particular, have social implications or consequences for society, groups, and individuals. Arguing against "technological determinism", technology is not "innocent" or inevitable, but is based on human decisions with foreseen and unforeseen social consequences. All technologies have this effect. Perhaps the Internet is the best example of this, given the scope of its influence.

Chasm vs Gradient

The imagery of a Divide is one of inclusion versus exclusion, of haves versus have-nots, of possession versus dispossession, of connectivity versus disconnectivity, of ins versus outs, of ones versus zeros. These are rather stark contrasts that may misrepresent the complexities of empirical reality. Putting together a series of overlapping digital divides produces the appearance of an overall gradation rather than a sharp separation between the connected and disconnected. For example, it is often stated that the "digital haves" are male, live in developed and wealthy countries, especially in suburbia, have high personal income and education, are white, and work in the information technology sector. In contrast, the "digital have-nots" are stereotyped as women, live in underdeveloped countries, have low income and education, belong to a visible minority racial or ethnic group, and works in an industry that has little need of information or communication technology. This contrast gives us a very simple and easy to understand, if somewhat distorted, picture of the digital divide. How do we characterize the university-educated woman who draws a high income from an information and communication company, lives in Bangladesh, and is a devout Muslim? How do we characterize a male African-American with elementary school education, draws a manual labourer's wage, but saves up enough money to buy a computer and an Internet connection so that his children will have an opportunity to develop their IT skills? Clearly, most people are not polar opposites in terms of the digital divide. They have some characteristics that shove them up into the "haves", and other characteristics that drop them into the "have-nots". So we may reflect reality better if we characterize the digital divide as a complex gradient or multidimensional prism rather than a dichotomous chasm.

The Reality of Virtuality

It has been argued that life on the Internet, communications online, virtual life, and playing

MUDS (Multi-User Dungeons) is a fantasy that has little connection to real life, to social behavior, to offline activity, or simply to what is summed up as "reality" (e.g., Postman, 1992; Talbot, 2002). Those who are hostile, sometimes for philosophical or personal reasons, or fearful of computer-based technologies, hold this view. However, I would like to adopt the opposite view. Rather than a separation between "real" and "virtual life", life on the Internet and the digital divide are reflections of daily living or "life off the Internet". The digital divide reflects non-digitalized personal, social, political, and economic divides. Social divisions in society are carried over and onto the Internet. The divides on the Internet, or in the context of the Internet, do not emerge from the "ether of cyberspace", but from the social, economic, and political context in which the Internet is born, nurtured, and diffused. If technologies are social relations (Marx, 1967), and if the Internet is a special case of technology, then the Internet is a series of overlapping and integrated social relations. This does not mean that the Internet and the digital divide are exact mirrors of societal divisions. Gender, age, income, class, educational, and cultural divisions "in real life" (IRL) become transformed by experiences on the Internet and in virtual life (IVL), and in turn intensify or lessen divisions in everyday life. There are few who would suggest that the Internet has had no impact on society, though some might argue that such an impact has been limited to a few sectors of society, or has created no fundamental transformations in society's institutions. There have even been a few media writers who have predicted the death of the Internet (e.g., Fenton, 1997). But, other than a few dissenters, there seems to be widespread agreement that the Internet has had a dramatic impact on society – with one important proviso. The impact so far has been restricted to the developed and highly developing countries (like Korea, Singapore, etc.). The 92% of the world that is not connected to the Internet have specific social, economic, political, gerontological, and gender characteristics, and have specific spatial locations in the global economy. These are the individuals, their organizations and institutions, who have not yet been affected, directly (at least yet) by the spread of the Internet in the West and within restricted elite circles in the developing and underdeveloped world.

Interests

Who has an interest in the digital divide? The answer lies perhaps in who talks and writes most about it. Arguably, the digital divide has received considerably more attention in the mainstream media than in academic peer-reviewed publications. The sources quoted, or interviewed, by the media have often been government and corporate representatives. Corporate officials have issued many statements to the effect that the "digital have-nots" need to be brought online for not-so-subtle reasons: to increase the pool of highly-skilled information technology workers; and, to increase the pool of consumers ready, willing and able to purchase goods online through the Internet (E-Commerce) (DiMaggio, 2001; Business Week, 2000). If six billion people in the world had access to the Internet economy and if they had the requisite purchasing power, it would create untold market opportunities for companies. But for companies to sell successfully globally through the Internet, consumers must not only be connected, but have the requisite technical skills and attitudinal disposition to purchase goods electronically, without (in most cases, yet) touching, feeling, or smelling the product, or dealing with the salesperson on a face to face basis. Thus, considerable research has gone into the issue of trust and willingness to purchase goods through computers connected to other computers (Cheskin Research, 1999; Hoffman, Novak, Peralta, 1998). One way to instill this trust and comfort with computer technology is to build a kind of digital cash nexus early in childhood and through schools (Facer et al, 2001). Hence, the focus by corporations and

governments on connecting schools to the Internet, on teaching technological skills to children at home and in schools, and on placing corporate ads as screensavers on school computers (Pellizarri, 2000). This has gone so far as the proposal to put corporate logos on university level courses (Newson, 1998). Government officials have also displayed a strong interest in the digital divide for a couple of reasons. One is to ensure the relative ranking of their own nation or country in a global competition where information and communication technology occupies center stage in such far flung fields as the stock market, electronic transfer of banking funds, distance education and training and producing cultural content in digitized form as a way of protecting the national cultural heritage. The other reason has to do with political self-interest: to provide an efficient medium for disseminating government or party propaganda, and to provide partisan public forums during elections. All major and even minor political parties today have a web presence. Besides corporations and governments, there is a third interest in the digital divide. This is the academic community, especially political scientists, and civil libertarians. The Internet's ideal is to enhance democratic participation in society. The fear is that the digital have-nots will be excluded, not only from democratic civic participation, but also from the information necessary to exercise one's rights as a citizen, including access to work and a livelihood.

Pace and Breadth of Change

There has been a debate over the pace of change engendered by the Internet. Technology enthusiasts have argued that the Internet has fundamentally changed every aspect of life to such an extent that its arrival is compared to the Industrial Revolution in its long-term impact (Castells, 1996). Many writers depict a "New Economy", sometimes called the "Knowledge Economy" or the "Digital Economy" (Wolfe and Gertler, 2000). The economy, it is argued, has moved into a new phase where commodities are information and knowledge, not physical goods. The digitization of information is wealth-creating activity that drives the economy and global trade. Work is structured around the networked computer. Even social life, all the way from e-mail, to entertainment, to accessing news, is organized around computer-mediated communications. Indeed, some studies have noted a decline in television watching and a corresponding increase in Internet surfing, though the findings are not consistent (Robinson et al, 2000; Flanagin, 2001; Ferguson and Perse, 2000). In Canada, 27% of Internet users report a decrease in television viewing since they first started using the Internet; only 1% reported an increase, and 72% reported no change (Dryburgh, 2001: 6). In contrast, there are those who argue that the pace of change on the Internet, though quick, is confined to limited information technology sectors of the economy in advanced capitalist countries. With only 6-8% of the world connected to the Internet, it is hard to argue against this view. Indeed, even within organizations connected to the Internet there are pockets of employees who resist integrating computers and the Internet into their work. In education, Geoghegan (1994) disparagingly calls them "the laggards" – the professors who are not interested in integrating technology into their teaching, or are hostile to doing so.

Twelve Perspectives on the Digital Divide

There are twelve different theoretical perspectives of the digital divide (Table 1). Each contributes a partial understanding, but on its own remains a partial explanation of the overall digital divide. The challenge is to put them together into a synthetic understanding of the

digital divide as a whole. The rest of the paper will discuss each perspective. Near the end I will consider more systematically their relationships to one another.

Table 1: Twelve Perspectives or Dimensions on the Digital Divide

Theoretical Perspective	**Base Concept**	**Relation across the Divide**	**Barrier**	**Resolution**
1. Demographic	Population; individuals	Computer to person ratio	Individual access	Government programs; employment opportunities
2. Geographic /engineering	Data packet; nation-state	Transmission	Infrastructure	Wireless
3. Gerontological	Age	Life cycle	Experience	Training
4. Feminist	Gender/sex	Patriarchy	Harassment	Androgryny
5. Psychological	Attitude; disposition	Confidence	Fear; technophobia	Long-term supportive training and socialization
6. Educational	Knowledge	Learning	Traditional education	Online distance education
7. Economic	Capital	Markets	Government regulation	Deregulation /privatization
8. Sociological	Occupational classes	Inequality	Unequal life chances	Equalization of conditions of opportunity
9. Labour	Work; skills	Exploitation via technologies	Property	Socialization
10. Cultural	Ethnicity	Majority – minority relations	Discrimination	Multilingualism
11. Disabilities	Body	Physical and mental impairments	Lack of understanding and social, economic, and political support	Adaptive technologies and designs (e.g. screen readers)
12. Political	Power	Rule	Non-democratic exercise of power	Online democracy

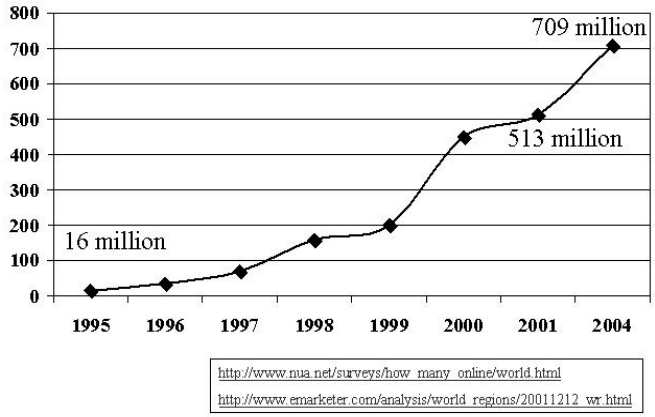
1. Demographic

"Digital demographics" measure the absolute number and percentage of the world's population that has access to computer technology and the Internet. To properly do this, we would have to count both the number of computers and the number of people who have access to computers. We would also have to count the number of connections among computers (the definition of the Internet), and more generally track these counts over time to arrive at an overall estimation of the growth, stagnation, or decline in the Internet.

The number of computer hosts or domains has been geometrically rising since the beginning of the Internet. The number of Internet hosts rose from a mere 4 in 1969 to 1,313,000 in 1993 (Zakon, 2001). That year ushered in the modern World Wide Web. Between 1993 and 2001, the number of Internet hosts rose from 1,313,000 to 125,888,197, an increase of over 900%. The number of web servers increased from 130 in 1993 to 31,299,592 in 2001.[2] The number of people connected to the Internet has increased dramatically. By one estimate,

there has been a worldwide increase from 16 million Internet users in 1995 to 513 million in mid-2001. Although great in absolute numbers, this has only been an increase from 0.39% of the worldwide population in 1995 to 8.46% in 2001.[3] It is estimated that the number of users connected to the Internet will rise to 709 million by 2004 (see Figure 1) (Featherly, 2001). Undoubtedly, the vast majority of the world (92%) is still not connected to the Internet, regardless of the propaganda emanating from the information technology industry. These figures represent the raw material from which the digital divide is built. The question they raise is whether such a large increase has been random, or channeled by a host of factors relating to the social, economic and political infrastructure of the Internet and society.

Figure 1: Number of World Wide Internet Users, 1995-2004



2. Geographic: The Global-Local

Has the digital divide been defined too much in terms of access to computers and the Internet? "Access" often seems to assume a psychology of the individual. The focus is on individuals, not on groups or organizations, though there has been a discussion among policy makers of community access, especially from rural areas. But communities have been depicted in a geographic or political/locational space, as territories, regions, states, provinces, jurisdictions (e.g., rural vs urban). The argument is made that rural communities have less access than urban communities. But the social organization of such communities is usually not considered.

Throughout human history, physical space and distance have helped to define the broad parameters of social space. Physical boundaries have been important in establishing the social boundaries of communities. Many writers have suggested that the arrival of the Internet has broken the link between the physical and social. It is argued that social space is no longer constrained by physical distance and boundaries. Much ink has been spilled over the ways in which virtual communities and virtual education escape physical distances and the constraints of place and location. This argument, however, cannot be taken too far. Although the Internet has helped to break down barriers of space, distance, and place, what we do virtually continues to be constrained in many ways by our physical limits of existence. Nowhere is this more evident than in the global configuration of the Internet. The Internet has not diffused randomly from country to country, or from the city to the countryside, but has spread in definite patterns, heavily constrained by the economic, socio-cultural, and political structures of nation-states.

We can look at this question from the vantage of

- Who "controls" the Internet and its content (hosts, domains, and servers), and
- Who consumes Internet content (individual users or clients)?

Although it is often said that the Internet has no control center, nevertheless a small number of countries, and their organizations, control critical nodes on the Internet. One way of looking at this is to examine the international distribution of Internet hosts and clients. Hosts are computers that serve up or publish content on the Internet. They need top-level domains (e.g., *.ca) to accommodate all the addresses of their users or clients. Clients are computers that consume the content offered by the hosts through networking with them. The Internet is a vast and complex network of host and client computers connected in a maze of crosscutting cables and wireless transmission of bit streams.

The most important historical fact in understanding international differences in Internet activity is that it started in the United States, steeped in the Cold War during the late 1950s and early 1960s. In the atmosphere of threatened Cold War intercontinental ballistic missile attacks and in response to the Soviet Union's launch of the Sputnik satellite, research was begun into the construction of fail-safe communication systems that would survive a nuclear attack. The Department of Defense, and several researchers at U.S. universities sponsored and carried out research on computer network protocols. It is well known that the United States dominated the early history of the Internet, although Tim Berners-Lee (1999) at CERN, Switzerland, is credited with inventing the World Wide Web or documents hyperlinked between networked computers. Over the past decade, the developed West and North has come to dominate the Internet, although the United States still plays a leading role and has a predominant influence over almost all aspects of the Internet. The story is told through early cyberspace mapping techniques. Larry Landweber and the Internet Society posted two well-known maps that contrast Internet connectivity in 1991 and 1997. In 1991, large parts of Africa, the Middle East, Russia, and Asia had no Internet connectivity, or had only Bitnet connections between university computers, or direct UUCP dial-up connections between Unix computers for e-mail. By 1997, there were only a handful of countries in Africa and Asia still without any connection to the Internet. In 1991, Internet connectivity was enjoyed only by North America, Western Europe, Australia, India, and some parts of Latin America. By 1997, almost the entire world had at least rudimentary Internet connectivity (Dodge, 1999).

The quality of the connectivity in underdeveloped and developing countries is far poorer than in the developed North. In Africa, Internet connectivity is largely confined to large urban centers where a minority of the population lives. Africa is characterized largely by low bandwidth and slow web speed, slow dial-ups, few computers permanently connected to the internet, a high proportion of shared computers and connections, and comparatively high cost of Internet connections in real dollars (Jensen, 2001).

In Latin America, Internet connectivity is impaired by deep economic and social inequality. Poverty in Latin America is very severe, which reduces the likelihood of significant increases in Internet connectivity below the middle classes. High long-distance telephone charges for

Internet connections are another inhibitor. Much of the English-language dominated Internet is also not accessible to the majority of the population, which does not speak English (Spanish and Portuguese are the preferred language in real life as well as in virtual life) (Rodriguez-Alvez, 1999; Williams and Bertino, 2001). Besides poverty, problems caused by drug trafficking in Bolivia, and its crackdown, have thrown many families out of business. Stress over drugs is more important in Bolivia than access to the Internet (Tran and Barrett, 2001).

One way of looking at the digitally powerful countries on the Internet is to examine the international distribution of hosts. This gives us a clue as to the nationality of organizations that determine Internet content delivered to the rest of the world. Table 2 shows the distribution of Internet hosts across the seven major regions of the world. The distribution of hosts is compared to the distribution of population. Column D gives the percentage of over- or under-representation of hosts compared to population. Three regions have more hosts than what we would expect on the basis of their population: North America (United States, Canada, Mexico); Europe; and Oceania (mainly Australia and New Zealand). By far the greatest over-representation (+61%) is enjoyed by North America. The greatest under-representation is suffered by Asia (-52%). Africa and Latin America are also underrepresented. Overall, the more developed regions of the world command most of the Internet hosts; and the underdeveloped or developing regions have no or only a few hosts. They are unable to put onto the Internet content that can compete on an equal footing with the overwhelming content placed on the Internet by the developed countries of the West and North.

Table 2: Internet Hosts by Continents and Regions (2000)

Country	Number of Hosts (A)	% of all Hosts (B)	% of World Population (C)	% Over- or Under-Representation D=(B-C)
North America	82,703,900	67.47%	6.70%	+60.77%
Europe	24,261,500	19.79%	11.99%	+7.80%
Oceania	2,198,960	1.79%	0.51%	+1.28%
Central America	481,960	0.39%	1.20%	-0.81%
South America	1,501,260	1.22%	5.70%	-4.48%
Africa	296,280	0.24%	13.24%	-13.00%
Asia	11,128,400	9.08%	60.66%	-51.58%
Total	122,572,260	100.00%	6,080,141,683	
Source: Adapted from Telcordia Technologies (http://www.netsizer.com/); and from U.S. Census Bureau, International Database (http://www.census.gov/ipc/www/idbnew.html)				

Table 3 shows the distribution of hosts among the ten top countries that have the greatest number of hosts, and compares this to the rest of the world. Almost two-thirds (63%) of Internet hosts are located in the United States, which had only 4.53% of the total world population in the year 2000. The top ten countries account for 88% of the Internet hosts, but only 12.33% of the global population. The rest of the world has the other 12% of the hosts, but an overwhelming 88% of the population. All ten countries that have the overwhelming majority of hosts are advanced capitalist societies, mostly located in the West and North. The exceptions are Australia, and two Asian economic powerhouses – Japan and Taiwan. The countries that control most of the Internet hosts can be viewed as the "digital haves." They are a kind of locational and organizational digital privileged sector of the world. The "digital have-nots" are those countries with few Internet hosts. To the extent that their citizens participate

at all on the Internet, it is primarily as clients consuming the Internet content offered up by the digital haves located in the advanced North and West of the globe.

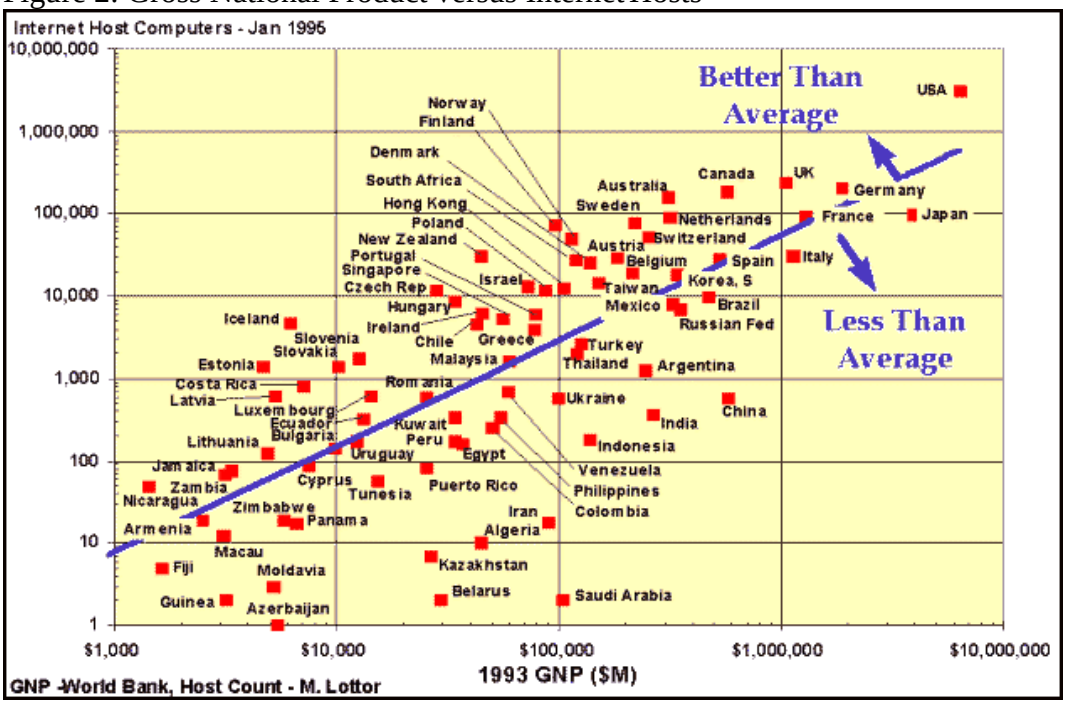
Table 3: Internet Hosts by Top Ten Countries (2000)

Country	Number of Hosts	% of all Hosts	% of World Population
USA	76,739,400	62.61%	4.53%
Japan	6,705,050	5.47%	2.08%
Canada	5,965,040	4.87%	0.51%
Germany	4,449,500	3.63%	1.36%
United Kingdom	4,370,040	3.56%	0.98%
Italy	2,523,080	2.06%	0.95%
Netherlands	2,005,580	1.64%	0.26%
Taiwan	1,984,800	1.62%	0.36%
Australia	1,770,860	1.44%	0.32%
France	1,716,540	1.40%	0.98%
Total Top 10	108,229,890	88.30%	12.33%
Rest of world	14,342,370	11.70%	87.67%
Total	122,572,260	100.00%	6,080,141,683
Source: Adapted from Telcordia Technologies (http://www.netsizer.com/); and from U.S. Census Bureau, International Database (http://www.census.gov/ipc/www/idbnew.html)			

Countries that dominate in the distribution of Internet hosts have high Gross Domestic Products (see Figure 2). Examples include the United States, Canada, United Kingdom, Germany, France, Japan, Australia, Sweden, Italy, and the Netherlands. Countries that have very few Internet hosts tend also to have the lowest GDP. This includes Moldavia, Nicaragua, Zambia, Armenia, Figi, and Guinea.

Another way to examine control is to study the international distribution of domain names. An Internet host that serves up content must have a domain name associated with its Internet address. Those countries that have the majority of domain names will in all likelihood determine the most of the content posted to the Internet. Studies of the Internet show a similar pattern in the international distribution of Internet hosts and domain names. The United States has the lion's share of top-level domain names (e.g. .com, *edu, *.net, *.org), except for country domain names (e.g. *.ca, *.usa, *.au, *.ru). In 1998, it had 75% of all domain names (see Table 4). However, this has since declined to 60% by July of 2001. This is a result of other countries and their organizations coming increasingly onto the Internet. After the United States, the countries with the greatest number of domain names are Germany (8%), United Kingdom (8%), and Canada (3.5%). In the top 25 nations, those with the least number of domain names tend to be from the South, such as India, Indonesia, South Africa, Turkey, and Brazil (Zook, 2001). Domain analyses can even be taken down to the level of the city and the neighbourhood. For example, Manhattan in New York City has a heavy concentration of domain name registrations, especially around Wall Street and in mid-town. The density of domain name registrations becomes much lighter in the boroughs (such as Queen's), as well as outside of New York City, especially in the rural countryside (Dodge, 1998).

Figure 2: Gross National Product versus Internet Hosts



Source: Dodge, 1998: http://www.geog.ucl.ac.uk/casa/martin/aag/aag.html

Table 4: Growth of Country and Generic Domains, United States and World, 1998-2001

Year, Month	Percent in U.S.	Country Domains	Total Domains
July, 1998	74.8%	1,127,483	3,282,117
January, 1999	74.4%	1,466,276	5,504,151
July, 1999	69.3%	2,045,716	9,098,066
January, 2000	66.7%	3,393,973	13,402,448
July, 2000	58.1%	6,450,232	23,864,611
January, 2001	60.8%	10,078,693	33,045,397
July, 2001	59.6%	12,465,548	37,539,541

Source: Adapted from OCLC http://wcp.oclc.org/

The cities in the developed north dominate international Internet traffic. The top city is New York (see Table 5). Two-thirds of all international Internet capacity flows through this city. With the exception of Tokyo, all the top 10 cities are either in the United States or Western Europe.

Table 5: Top 10 Interregional Internet Hub Cities, 2001

Rank	City	Country	Interregional Internet Bandwidth
1.	New York	U.S.	149,989.5 Mbps
2.	London	U.K.	85,518.7 Mbps
3.	Amsterdam	Nether.	24,479.6 Mbps
4.	Paris	France	22,551.8 Mbps
5.	San Francisco	U.S.	20,813.6 Mbps

6.	Tokyo	Japan	16,745.5 Mbps
7.	Wash., DC	U.S.	13,261.2 Mbps
8.	Miami	U.S.	11,912.4 Mbps
9.	Los Angeles	U.S.	11,227.0 Mbps
10.	Copenhagen	Denmark	10,417.0 Mbps

TeleGeography, Inc. 2001 http://www.telegeography.com/Whatsnew/pg02_press2.html

Control of the Internet through hosts and domain names enables the tracking of the flow of messages across borders. This is obviously easy to do for any country that already has a substantial lock on hosts and domain names. The United States has a long history of electronic eavesdropping on the international stage. In the wake of September 11, 2001, the United States is pouring money into Internet data tracking software. Daniel Ryan, former director of information systems security at the Pentagon, states that "by tracking data packets as they move across the Internet, [we] can see who is sending and receiving messages, which can help [us] identify people who might be involved in terrorist activities" (Zyskowski, 2001). Its current system is a piece of software called Carnivore. The FBI installs it at selected Internet Service Providers (ISPs). It scans all e-mail, web surfing, and online banking activities flowing through ISPs. It can be customized to extract all messages from any individual sender. However, it is an inefficient system since it is intrusive and requires the forced compliance of the ISPs (King and Bridis, 2000). Work is now proceeding on remote sniffing of Internet data packets. This innovation extends, to a new level, the degree of American control and surveillance of global Internet content, an issue often not discussed in the digital divide literature, but highly germane to it. This is being threatened somewhat by the recent decline in United States dominance of the Internet, even though it still remains the hub of the Internet: "…most countries have become less dependent on the United States as a switching station. But the United States remains the world's main hub -- as of mid-2001, more than 80% of international Internet capacity in Asia, Africa, and South America still connected directly to a U.S. city."[4] If the United States was not a "digital have" country, it could not implement such devices. By the same token, "digital have-not" countries do not have the same controlling position on the Internet, and so cannot engage in such measures in national self-defense. Later, under the political section, we will see some of the measures that they are able to initiate.

Turning to Internet users, consumers, or clients, there is a strong global inequality in computer ownership and online access to the Internet based on international economic development. The more developed a country (measured by GDP or average income per citizen), the greater the proportion of its citizens who own computers and have Internet access. Excluding Canada and the United States, developed and advanced developing countries like Sweden, Denmark, Norway, Australia, and South Korea have a greater proportion of households with one or more computers; underdeveloped or developing countries lower in world economic rankings, like India, Mexico, Brazil, Argentina, and South Africa, have much smaller proportions of households with at least one computer.[5]

Table 6 shows the contrast between those who are online and total national and regional population in the world. As in the case of hosts and domains, the more advanced the development of a country or region, the more likely its citizens are connected to the Internet. In 2001, the United States had the largest proportion of adults online (60%) of all countries in

the world. This is followed by Canada (46%) and Europe (21%). In contrast, 7% or less of adults in all other major regions of the world were connected to the Internet. The world total is about 80%. These are the "digital haves". The "digital have-nots" consist of 92% of the world's population. Such figures give pause to the assumption that "we are all connected" and "we are all part of a global village." It may be argued that most of the world is (a) not aware of the Internet, or (b) if they are aware of it, they have no interest in getting connected, or (c) if they do have an interest in getting connected, they cannot do so because of poor economic circumstances or lack of national infrastructure.

Table 6: Number and Percent of Population Who are Online, by Major Regions of the World, 2001

	Number Online	**Population ('000)**	**% of Population Who are Online**
Canada	14.44m	31,592,805	45.71%
USA	166.14m	278,058,881	59.75%
Europe	154.63m	728,976,603	21.21%
Middle East	4.65m	174,626,986	2.66%
Africa	4.15m	823,490,269	0.50%
Asia / Pacific	143.99m	3,736,874,357	3.85%
Latin America	25.33m	350,819,346	7.22%
World Total	513.33m	6,124,439,247	8.38%

Source: Adapted from NUA Internet Surveys

IPSOS-Reid (2001) has divided the world into the following four types of countries in terms of Internet access in the year 2000:

- *Leading Edge:* Sweden is the most connected, with 65% online, followed by Canada with 60% and the United States with 59%. Other leading edge countries are Netherlands (57%), Australia (54%), Finland (53%), Switzerland (51%), Singapore (46%), South Korea (45%), UK (35%), and Germany (37%)
- *Advancing:* Belgium (36%), Taiwan (35%), Hong Kong (34%), Urban Mexico (33%), Japan (33%), France (30%), Italy (28%), and Urban Malaysia (26%),
- *Emergent:* Urban Brazil (22%), Spain (22%), Urban China (21%), Urban Argentina (20%), Poland (19%), Urban Columbia (17%), Urban Egypt (17%), and Urban South Africa (6%).
- *Nascent:* Turkey (13%), Urban India (9%), and Urban Russia (6%).

The digital have-nots, to the extent that they are able to begin to access the Internet at all, are more likely to access the Internet outside their own home, such as at work, school, Internet cafes, and community centres. "Nearly nine million people – or 51% of the Internet population in Brazil, Mexico, and Argentina – use the Internet away from home" (ACNielsen eRatings, 2001). The lack of Internet access from home and even school has led to greater popularity of cybercafes and community access centers in the developing countries than in the developed west. Paraguay established a network of 20 community centers called Amic@s (Aranda, 1999). This is part of the perniciousness in the inequality of the digital divide. Not only are citizens of poorer countries less able to access the Internet because of poorer national development; those who do connect are less likely to do so from home. The digital infrastructure that we come to expect in developed countries is absent in poorer regions of the world. This forces the citizens of such countries to rely on public points of access, or even commercial cybercafes, to a much greater extent than is true in developed countries.

The global digital divide is not static; it is very dynamic and changing over time. Table 7 shows changes in the absolute numbers and percentages of those connected to the Internet between 1997 and 2001. The most dramatic changes are occurring in two "opposite" areas of the world. Because of the recent total growth in world online users, the proportion of global Internet users living in the United States has plummeted from 58% in 1997 to 32% in 2001. In contrast, the proportion of Internet users residing in Asia has increased from 13% in 1997 to 28% in 2001. In fact, with the exception of the United States, Canada, and Europe, all major regions of the world have witnessed growth in Internet users. Because the vast majority of the world lives in underdeveloped and developing regions, the greatest growth in Internet connectivity has occurred among what might be considered "digital have-not" regions. It is estimated that the number of Internet users in the People's Republic of China will rise from 4 million in 1999 to 60 million in 2005. By 2010, Chinese Internet users will outnumber those from the United States.[7] There will be a further decline in the proportion of all Internet users who reside in the United States. According to some estimates, the United States share of total world Internet users will decline to 27% by the end of 2005.[8] In terms of accounting for the proportion of global online users, it is therefore the developed regions or the "digital haves" that are starting to decline. It is expected that this trend will continue into the future, with implications for the multiculturalism of the Internet. I will take up this topic later in the paper.

Table 7: Regional Distribution of Online Users (in millions), 1997-2001

	2001		2000		1999		1997	
	Number Online	**Regional Share of Online**	**Number Online**	**% of population**	**Number Online**	**% of population**	**Number Online**	**% of total world online**
USA	166.14	32.36%	153.84	37.81%	106.3	56.02%	56	58.12%
Canada	14.44	2.8%	13.10	3.2%	13.28	7.0%	4.6	4.8%
Europe	154.63	30.12%	113.14	27.80%	36.55	19.26%	20	20.76%
Middle East	4.65	0.9%	2.40	0.6%	0.88	0.5%	0.5	0.5%
Africa	4.15	0.8%	3.11	0.8%	1.14	0.6%	1.0%	1.0%
Asia/Pacific	143.99	28.05%	104.88	25.77%	26.97	14.21%	13	13.49%
Latin America	25.33	4.9%	16.45	4.0%	4.63	2.4%	1.25	1.3%
Total Online	513.43	99.93%	406.92	99.98%	189.75	99.99%	96.35	99.97%

Source: Adapted from NUA Internet Surveys[9]

Rural/Urban Internet Access

Around the world, urban areas have historically enjoyed greater Internet access than rural areas. This is partly a reflection of the technology infrastructure, and partly an efficiency of scale. Urban areas become wired first, followed by small urban centres, towns and villages, and lastly isolated rural areas. It costs governments and IT companies less per citizen to wire densely populated urban areas than sparsely populated rural areas. Where rural areas do have access, and urban/rural differences persist, socio-economic characteristics of rural and urban dwellers become important. Urbanism is correlated with greater individual education and wealth, correlates of Internet access, as we shall see below.

In the United States, in 1998 27.5% of urban households had Internet access, compared to 22.2% of rural households. In 2000, 42.3% of urban households had Internet access compared to 38.9% of rural households (NTIA, 2000: 4). Even in computer ownership, each of the four

surveys conducted by the NTIA between 1994 and 2000 shows slightly greater computer ownership among urban households than rural households (NTIA, 2000: 7).

It can be argued that the rural/urban digital divide is greater in underdeveloped and developing than developed countries. Because of infrastructure, Internet access in developing countries is typically restricted to major urban centers. Kabati (1999) argues: "In most developing nations, Internet services have rarely spread beyond the capital and a few selected large urban centers. In Kenya, for instance, more than 85% of the users are concentrated in the capital city of Nairobi; similarly, Moscow and Buenos Aires account for 64% and 60% of all Russian and Argentine users, respectively. Major factors leading to this skewed profile of users are that ISP presence in the interior of most developing nations is scarce and that ISPs established in the capital do not have Internet points of presence in the interior. In Cameroon, dial-up services at local call rates are available only in Yaoundé and Douala. Elsewhere, it is necessary to make expensive long-distance calls to dial up the ISPs in the two major cities. In the few instances, however, in which services have been established in the interior, local users have to pay higher prices than their counterparts do for comparable services in the capital cities. Starcom in Uganda, for example, charges US$ 30 for e-mail only services in Kampala (the capital), and US$ 50 in Jinja and Mbale (two cities in the interior)."

There is thus a strong contrast in the circumstances and connectivity problems between rural areas of developed and underdeveloped countries. It is important that we not lose a sense of this diversity and heterogeneity in our rush to simplify the concept of the digital divide.

I will now briefly discuss obstacles to connecting to the Internet in underdeveloped and developing countries.

Obstacles to Internet Use in Developing Countries

Lack of Telecom Infrastructure. Most underdeveloped and developing countries do not have the communications technology infrastructure to provide their citizens with decent access. For example, in 2001, there were only 40,000 e-mail accounts and 3,600 Internet accounts in Cuba. The reason is a lack of infrastructure. "The island has only one phone line for every 23 Cubans, power outages are common, and computer modems are difficult to obtain."[10]

Cost of Accessing the Internet. Even though access charges in North America, whether telephone or cable modem, are comparatively low and do not pose a significant barrier to Internet access, this is not the case for many developing countries. The Organization of Economic Cooperation and Development (OECD) estimates that, for 40 hours of Internet access per month, the costs are USD 173 in the Czech Republic, USD 150 in Hungary, USD 48 in Denmark, and only USD 24 in the United States. It is therefore not surprising that Internet access is more widespread in the United States and Denmark than in Hungary and the Czech Republic, though costs are not the only explanation for international access differences. The OECD concludes that "Countries in Eastern Europe and Latin America tend to have high telephone costs and few Internet users, while Scandinavian countries, have low telephone costs and more advanced Internet use."[11] Kabati (1999) shows that access charges are much higher in Argentina, the Dominican Republic, India, Armenia, Kenya, and

Ghana than in Finland and the United States (see Table 8). "Access costs to end users in the least developed nations are prohibitively high. A large part of the reason is the major operating costs that arise as a result of inadequate and poorly maintained telecommunications infrastructure in developing countries. The price paid by users for Internet services – in absolute terms – is substantially higher in less developed countries than in more developed ones. …The prices are very high relative to the purchasing power of most people in less developed nations. In Armenia and Kenya, for instance, the absolute price for an Internet connection stands at the very high figures of USD 121 and USD 100, respectively, but after adjustment is made for the gross domestic product per capita, Internet users in Armenia and Kenya pay an incredible 485 and 413 times more than users in Finland, for more inferior services." A similar argument can be made for computer costs. According to United Nations data, "the average wage-earner in Bangladesh would need to spend eight times his or her annual salary in order to buy a computer, while a US wage-earner would spend only one month's salary" (Afemann, 2001).

Table 8: End-User Costs of Full Internet Access by Country, 1998

	In US$	**% of GDP per capita**
USA	20	1
Finland	18	1
Dominican Republic	26	24
Argentina	50	9
India	82	308
Armenia	121	485
Kenya	100	413
Ghana	50	189

Source: Adapted from Kabati, 1999

State Regulation of Telecommunications. Restrictive state controls have been seen as impeding Internet access and increasing its costs in developing countries. Competition in the telecommunications sector has been strongly urged by private business. Kabati (1999) suggests "monopoly control by public entities is a major factor responsible for the high costs of international access for ISPs in developing countries." For example, the police in Iran closed over 400 cybercafes allegedly on the grounds that they did not have a permit to operate. Over 100 ISPs argued the real issue was that the Telecommunications Ministry (PTT) acted as a state monopoly, afraid of losing business to the private sector. It refused to grant telephone lines to private ISPs.[12] The Chinese government passed new laws according to which it must own at least 51% of the shares in all information technology companies. This is seen by the IT business community as restricting investment in IT in China, and hence the private development of the IT infrastructure.[13] In Indonesia, the government controls licensing of ISP's through the Dirjen Pos & Telekomunikasi, Departemen Perhubungan RI. Most ISPs are located in the Jakarta area, which restricts access from most parts of Indonesia. Domain name registration is restricted to Indonesia companies. It is therefore not surprising that the growth of Internet users in Indonesia is flat compared to other Asian countries (Rahardjo, 2001).

Lack of IT Skills. Many underdeveloped and developing countries do not have much access to the Internet because their population does not have the experience and skills in the use of computer technology. For example, despite popular impressions of censorship, only 15% of

Iraqi citizens access the Internet because of a lack of basic IT skills, not because the government censors the Internet. This small segment consists of the highly educated and hi-tech sector of society.[14]

Low Literacy Rates. Given the text nature of the Internet, low literacy rates in under-developed countries poses a serious challenge to the wider adoption and use of the Internet. An insidious side effect of these low literacy rates is that there is not the same pressure for data networks as in developed countries. More emphasis is therefore placed on voice services, such as telephone and mobile phones, than in developed countries (Kabati, 1999).

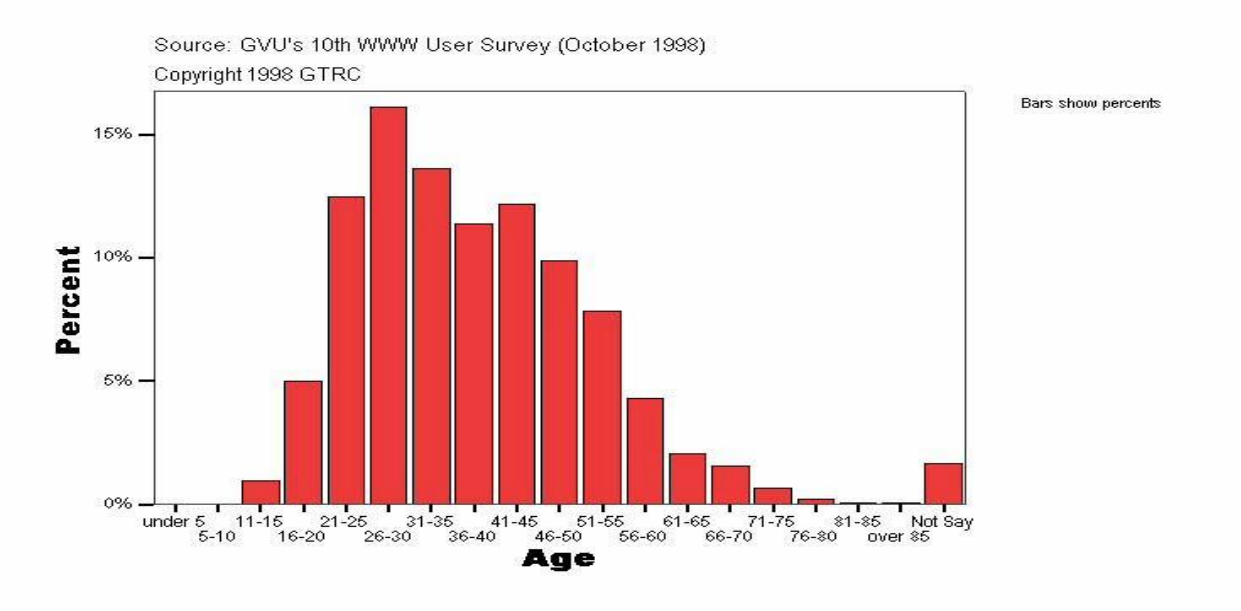
Among other reasons cited for low Internet access in the digital have-not countries are slow deregulation of telecommunications, the need for other communications networks (phone, television, road, rail), low disposable incomes, widespread distrust of the Internet, and low credit card penetration. Such issues are so endemic to the structure of developing countries that it is hard to see any quick acceleration in Internet use in this area of the world in the foreseeable future, other than within the small pocket of elite business persons and highly educated professionals. However, many have suggested that the developing world can leap frog into the Internet age by skipping the stage of fiber-optic wiring which developed countries went through at an earlier stage, and go straight to a wireless solution. Wireless networks are seen as cheaper, quicker to deploy, and easier to maintain, even though there are debates over international wireless standards (Kubati, 1999). It is far too early to determine whether this new technology will have any significant effect on closing the digital divide between the South and the North.

3. Gerontological

There is a considerable literature that suggests older persons and seniors have less Internet access than younger persons. In fact, some of the studies suggest a curvilinear relationship in which computer use and Internet access increase with advancing age until late in one's working career, after which use and access plummets rather dramatically and suddenly. Children, teenagers, and seniors as often seen as the "digital have-nots", while middle-aged persons are seen as the "digital haves" (e.g., Ogozale, 1991; Adler, 1996; Ryan, Szechtman, and Bodkin, 1992; Finn, 1997; Philbeck, 1998; Cody et al, 1999).

Figure 3 is taken from the 1998 GVU (Graphic, Visualization, and Usability Centre) web survey. It shows the age distribution of web users, primarily in Europe and the United States, who filled out its online survey in October of 1998. It is typical of many surveys showing a curvilinear relation between present age and Internet usage. This survey shows an increase in web use from age 11 to 15 years of age to a maximum between 26 to 30 years of age, after which there is a fairly steady decline with advancing age. It should be noted that this is a survey of online activity, not of whether or not one uses the Internet or web. Nevertheless, it does show very little web use among the very young, and among the elderly and seniors, at least compared to middle-aged persons.

Figure 3: Age of Web Users, 1998, Europe and the United States



In order to gauge the proportions of a population who may or may not use the Internet, we have to look at general social surveys. In the *Falling through the Net* Series in the United States, the Department of Commerce reports a somewhat earlier peaking of Internet use between the ages of 18 and 25 (see Table 9). This level is maintained almost to the same degree among those between 26 and 49. The decline only seems to start in one's later working career (in the 50's and later). This suggests a long bulge at early to mid-age (from 9 to 49 years) in Internet connectivity. The period of very low Internet use is at the two opposite extremes of the age profile: between 3 and 8, and after 50 years of age. This might lead us to argue that the "digital-haves" are middle-aged persons, and the "digital have-nots" are the very young, and the elderly and seniors.

Table 9: Internet Use in the United States, by Age, 1998, 2000 (percentage) Source:NTIA, 2000:41

Age	**1998**	**2000**
3 to 8	11	15
9 to 17	43	53
18 to 25	44	57
26 to 49	41	55
50 and over	19	30

Canadian data show similar trends to American data. It is difficult to obtain exactly the same age categories between the United States and Canada. The Canadian data in Tables 10 and 11 begin at a later age (less than 35 in Table 10 and 15 to 24 in Table 11). So the early years cannot be strictly compared between our Canadian and American tables. Nevertheless, the Canadian data do suggest somewhat lower Internet usage in the earlier years, especially in 1994 in Table 11. However, the Canadian data in the year 2000 in Table 11 suggest more of a linear relationship, with Internet use constantly decline with advancing age, from 84% among the 15 to 24 year olds to 17% for those over 55 years of age. This may be the product of the SchoolNet program in Canada, which connected all schools in the country, as well as of increased computer usage at home.

Table 10: Percent of Canadians with Internet Access by Age, 1997 to 1999

Age	1997	1998	1999
<35	38	45	53
35 to 54	39	47	55
55 to 64	21	28	33
	6	7	10

Source Dickinson and Ellison (2000: 7)

Table 11: Internet Use in Canada by Age, 1994, 2000 (percentage)

Age	1994	2000
15 to 24	16	84
25 to 34	21	65
35 to 44	17	60
45 to 54	19	51
55 and over	12	17

Source: Statistics Canada, General Social Survey (2001: March 26)

Several explanations can be offered for these age and Internet usage variations. First, there is a generational or historical effect. Seniors never grew up with computers and the Internet in their daily lives. Many were already "past their prime" when desktop computers and the Internet started to diffuse widely in homes, schools, and offices. They therefore missed the opportunity of integrating these technological devices into their daily and active lives. Second, it has been suggested, somewhat in parallel with the first reason, that seniors and persons near retirement manifest high levels of personal and psychological anxiety about computers and the Internet. Not having grown up with them, they appear as strange and foreboding devices, if not monsters, that threaten their psychological wellbeing and sense of self. Researchers have shown somewhat elevated levels of technophobia and computer anxiety among elderly persons (Teo, 2001). Third, there is an "institutional effect." Many persons start using computers in schools, colleges, universities, and workplaces. Seniors were often beyond formal education days, and even past employment, when they could have had their first contact with networked computers. Fourth, it has been suggested that there is a nurturing effect. That is, young persons born after 1993 have been brought up or "weaned" on the computer. They cannot remember a time in their lives when computers and the Internet were not readily available and accessible in their homes and schools. Computers do not pose any big challenge to them. They are a natural part of their surroundings, as much as the telephone, toaster, radio, or automobile, were to an older generation. It has often been observed that young persons take to computers the way fish take to water. It seems second nature. Young persons often display a high level of confidence and easy use of computers and the Internet that continues to amaze their elders.

In contrast to the above arguments, there are several that challenge the research on which they are based, or question their assumptions. New studies have revealed a number of changes. The most important are the following. First, some evidence suggests that one of the most rapidly growing populations of new computer and Internet users are older persons. Reddick, Boucher and Groseilliers (2000: 37-38), in their careful Canadian study of the digital divide, state: "Canadians over the age of 65 have the greatest rise in Internet use from 1998 to 1999, with a staggering 143% increase in one year. Despite this impressive increase, their numbers remain far below the average Internet use among younger Canadians." Although only about 15% of seniors in the United States use the Internet, this figure is about

to rise since 51% of those between 50 and 64 years of age already use the Internet. Second, studies done by myself suggest that the important age variable is not present age, but the age at which a person first experienced a computer. When one statistically controls or holds constant the relationship between present age and computer self-confidence by age of first computer use, older persons are more confident in their use of computers. In fact, age of first computer use overwhelms and reverses the effect of present age, which now becomes positive (rather than negative). The younger a person is when they first touch a computer, the more confident they will be with computers, even at an older age. When one takes into account first computer use, age increases confidence in computer usage. This suggests that it is not age per se, but computer experience that is the critical variable in explaining the computer anxiety or computer self-confidence of the elderly population. Third, some active elders and seniors have discovered e-mail as the killer Internet application. They have taken to computers because they are able to stay in touch with their family around the country or world at a low cost. These are some of the bridges or ramps being built across the digital divide between the elderly and young persons with respect to computer and Internet usage.

Table 12: Gross and Net Effects of Present Age and Age of First Computer Use on Present Computer Self-Confidence

Computer self-confidence (17-item index)	**Present Age**	**Age First Used Computer**
Zero-order correlation coefficient	-0.12	-0.25*
Partial-order correlation coefficient	+0.44	-0.49*

Source: Carl Cuneo (EvNet Surveys)

Aging also interact with other dimensions of the digital divide. In the United States, gender differences are more severe among seniors than among younger persons. Only 40% of online seniors are women, even though they outnumber men in this age bracket; and there is virtually no gender difference in the U.S. population.

4. Feminist

Traditionally women have had less access to the Internet than men, though women have often communicated more once on the Net. Table 13 shows the gender of web users collected by the Georgia Tech bi-annual surveys between 1995 and 1998 for Europe and the United States. In both regions, men are more represented on the World Wide Web than women. However, in both regions, there is a decline in the size of the gender gap. In Europe, the gender gap decreases from +86% in favour of men in 1995 to +64% in 1998; in the United States, the gender gap decreases from +64% in favour of men in 1995 to +8% in 1998. So in both regions women are starting to catch up to men, but by 1998 there are still significant differences in favour of men, especially in Europe. The gender gap is never closed, at least not in these data. This seems to suggest that Europe on the whole is a more patriarchal society than the United States. However, this broad sweep hides individual differences between countries.

Table 13: Gender of Web Users, Europe and United States, 1995 to 1998 (percent)

	Europe			**United States**		
Year	**Men**	**Women**	**Men minus Women**	**Men**	**Women**	**Men minus Women**
1995	93%	7%	+86%	82%	18%	+64%

1996	85%	15%	+70%	66%	34%	+32%
1997	85%	15%	+70%	67%	33%	+34%
1998	82%	18%	+64%	44%	36%	+8%

Source: Adapted from GVU Web Surveys, 1995-1998

Table 14: Internet Audiences by Gender At-home Users, June 2001

Country	Percent Male	Percent Female	Men minus Women (%)
Saudi Arabia[16]	78.00	22.00	+56
Germany	63.40	36.60	+26.8
France	61.88	38.12	+23.76
Italy	60.91	39.09	+21.82
Spain	60.88	39.12	+21.76
Belgium	60.60	39.40	+21.2
Netherlands	59.81	40.19	+19.62
Brazil	59.71	40.29	+19.42
Switzerland	58.69	41.31	+17.38
Japan	58.39	41.43	+16.96
Austria	58.13	41.87	+16.26
Norway	57.95	42.05	+15.9
UK	57.17	42.83	+14.34
Israel	57.10	42.90	+14.2
Hong Kong	56.61	43.39	+13.22
Singapore	56.51	43.49	+13.02
Denmark	55.86	44.14	+11.72
Taiwan	55.80	44.20	+11.6
Ireland	54.78	45.22	+9.56
Sweden	54.76	45.24	+9.52
South Korea	54.35	45.65	+8.7
Mexico	54.00	46.00	+8
Finland	53.94	46.06	+7.88
New Zealand	52.52	47.48	+5.04
Australia	51.57	48.43	+3.14
Canada	49.00	51.00	-2
United States	47.28	52.18	-4.9

Source: Adapted from Nielson/NetRatings[17]

In Table 14, I show individual country differences for the year 2001. I have also ranked the countries from the greatest gender difference favouring men at the top of the table to the greatest differences favouring women at the bottom. The greatest gender digital divide is in Saudi Arabia where 78% of Internet users are men and 22% are women (a 56% digital gender gap). One might conclude that the gender divide is greater in under-developed regions than developed countries. For example, Brazil has a 19% gender gap in favour of men. In Canada and the United States, the gender divide is practically wiped out. Women are slightly more represented on the Internet than men. But there are many data in Table 14 that defies the simple argument that the digital gender gap is greater in the South than in the North. Developed countries like Germany, France, Italy, Belgium, and the Netherlands have gender in favour of men much greater than in such less developed countries as Hong Kong, Singapore, Taiwan, Mexico, and South Korea.

It would be hard to argue that the gender digital divide is necessarily greater in the underdeveloped or developing South of the world than the developed North. The safest conclusion is that the gender divide and the global national divide are separate and independent aspects of the digital divide. Nevertheless, one would expect more gender inequality in access

to the Internet in those countries that have deeper social divisions based not only on gender discrimination, but also on other variables associated with gender, like income, education, and socio-economic status, and occupational stratification.

It can be argued that social divisions in society and social inequalities in daily life are reproduced online. Various aspects of the digital divide should reflect social inequalities in society. Nowhere is this more evident than in the case of gender. What women do off line they are likely to carry over into online activities. Men are also likely to carry their offline activities onto online life. So gender divisions on the Internet should reflect gendered divisions offline in daily life.

In their daily lives, women usually take responsibility for family communications; thus they are more likely to take care of greeting cards and sending flowers. It is therefore not surprising to discover that women carry these kinds of responsibilities into their online Internet behaviour. Jupiter Media Metrix, an international Internet market research company, found gendered differences in the web sites visited by women and men in a 2000-01 survey of United States online users. The male and female audience for these types of sites were: retail flowers, gifts and greetings: women (53%), men (40%); electronic cards: women (52%); men (39%); and, retail fragrances and cosmetics: women: (53%); men (27%) (Dougherty, 2001). In Canada, ACNielsen found that gender-related ads appeal differently to female and male Internet users (see Table 15). Men are more likely to be attracted to Internet ads on computer hardware and software, sports, automobiles, and electronics, while women are more likely to be attracted to ads on health, food and recipes, and clothing. In daily life, men are more likely to shop for computers, cars and electronics than women.

Table 15: Categories of Ads Relevant to Consumer's Interests by gender, Canada, 2000

	Women	**Men**
Health	38%	20%
Food & Recipes	38%	15%
Clothing	21%	6%
Computer Software	14%	38%
Computer Hardware	14%	35%
Sports	12%	30%
Automotive	9%	29%
Electronics	5%	24%

Source: ACNielsem (2001) Internet Fact Book [online] [accessed December 22] http://www.acnielsen.ca/sect_fastfacts/Internet_fastfacts_en.htm

The gendered digital divide has deep roots in access to technologies in childhood and throughout school. Compared to girls, boys are encouraged by their parents, especially their fathers, to use computers, access the Internet, and play online video games. This affects their later attitudes to technology in elementary and secondary school, and the kinds of academic courses they choose to take or avoid. Girls will more often shun computer courses than boys (Davies, 2001). Teachers will provide more encouragement to boys than girls in technology courses. This has a ripple effect on the academic choices made later when these students attend college or university. Boys will more often gravitate toward engineering and computer science courses. Girls will more often opt for the health

sciences, social sciences, arts, and humanities. Between 1993 and 1998, 41% of all college males in Canada, but only 6% of all college females, graduated with diplomas in engineering and applied sciences; during the same period, the proportion of college males who graduated with a college diploma in the social sciences and services varied between 11% and 13%, while 24% to 26% of college females graduated in this field; in the health sciences, there were 5% to 7% of college males, and 18% to 23% of college females.[18] University qualifications in the field of education varied from 10% to 12% of men between 1994 and 1998, and 18% to 21% of women in the same period. Women remained substantially more represented in receiving qualifications in the specialization of education studies; similarly in the health professions and occupational qualifications, about 5% of men and 9% of women received university qualifications. In contrast, of all those receiving university qualifications, about 14% of the men were in engineering and applied sciences, but only 3% of the women were in this field.

From this background, we would expect that girls and women would have less activity in using computers and connecting to the Internet than boys and men. Men are more likely to be the *designers* of computer and Internet programs and applications; women are more likely to be the *consumers* of computer and Internet programs and applications. There is a considerable body of literature and research that supports this contrast.

How can we summarize the factors that perpetuate this gendered digital divide? Among those most frequently cited in the literature are:

- Parents are more likely to encourage their male than their female children to use computers and the Internet.
- Boys at home have role models in fathers using computers and the Internet; girls at home are less likely to have mothers in this kind of role model. They are more likely to see their mothers as consumers of Internet applications, to the extent that they use computers at all.
- Teachers in elementary and secondary schools are more likely to encourage boys to enter and excel in computer and technology programs; girls do not receive the same encouragement from their teachers.
- By the time high school students enter university and college, their attitudes towards, and experience with, computers is to a large degree set in stone. It is therefore not surprising that boys will more likely than girls gravitate toward engineering, computer science, and technology courses and degrees.
- Girls and women are more likely to be harassed in using computers and surfing the Internet. It is not just the massive pornographic content on the Internet that poses a problem for women and young girls. It is also that boys are more likely to engage in aggressive and flaming styles of communication, and will hunt for girls to engage in "information highway road-kill". It is little wonder that many girls and women find the Internet to be an unfriendly and unsafe place to learn, work, and play.
- Much research shows that women and girls have somewhat higher levels of computer anxiety and "technophobia" than men and boys. Women are more likely than men to fear that they will "break" a computer by executing an incorrect application routine, by taping the wrong key on the keyboard, or clicking the

mouse button at the wrong time and place. These are tactile movements with objects that are not well understood by the technophobic. Understanding reduces anxiety. This is a vicious cycle in which the lack of understanding increases computer anxiety, which reduces the motivation to understand. Comprehension is not based on native or genetic talent, but the social circumstances that enhances understanding for one gender and impairs understanding for the other gender.

- There is research on the gender of Internet language that suggests that the words employed by women and men on the Internet are gender-specific. They tend to act as cues to one's gender identity, which one may be trying to mask. They also suggest the "technology vocabulary" is stranger and more awkward among women than men. For example, many computer parts (all the way from "master and slave hard drives" to hits on web sites, pointing devices, phallic handles, and female and male connectors) take on a sexual overtone that lends a chilly or poisoned atmosphere to cyberspace. Computer parts are invariably referred to by male names, unless they are dependent, like a "lovely slavish drive". In 1982, Time Magazine even named the Computer as the Man of the Year.
- Some researchers suggest that subtle forms of gender discrimination are practiced in the entrance to information technology jobs. These operate to discourage women from applying for hi-tech jobs.

The conclusion I would draw is that the gender statistics on access to the Internet are only the tip of an iceberg that hides much deeper social psychological and social structural mechanisms reinforcing a gender typing in almost all aspects of technology. Hence, the gendered digital divide is not likely to disappear any time soon, especially in those countries that have well-entrenched patriarchal structures.

5. Psychological

A few psychologists have suggested that there is a psychological Digital-Divide (Eastin and LaRose, 2000; Wallace, 1999). Some individuals become connected to the Internet and use it avidly because they have a high degree of self-confidence and efficacy, and low anxieties, about utilizing computer technologies. Other individuals have low self-confidence and high anxieties. These form effective psychological blocs to computer and Internet usage. An extensive review of the early research literature has shown that as much as one-quarter to one-third of the population suffers some form of computer anxiety, variously known as "computerphobia", "technostress", or "technophobia." (Glass, Knight, and Baggett, 1985). In one of its most severe forms, a technophobic person "exhibits the classic signs of an anxiety reaction when facing computer interaction, including sweaty palms, heart palpitations, headaches, and so on." (Rosen, Sears, Weil, 1993: 29).

Eastin and LaRose (2000) point to a vicious circle that could solidify the Internet divide. Those with prior Internet experience develop a greater Internet self-efficacy over its use, such as understanding and using its hardware, software, and solving Internet-related problems. Internet efficacy, in turn, leads to greater Internet use, and access to greater sources of information and entertainment, and contact with others. Those without prior Internet experience are easily discouraged, thereby impeding their access and

use of the Internet, and denying them the positive benefits of greater information, and social, economic, and political outcomes. They warn that we should not associate race and class with negative psychological stereotypes among the digital have-nots. They state: "…by vigorously publicizing the digital divide as an important social problem while simultaneously defining it in terms of race and class, there is the risk that deficient computer skills will come to be viewed as stereotypical of the groups that are presently below the divide. Social cognitive theory warns us that when this happens, the stereotyped group tends to adopt the stereotype as a standard for their own self-comparisons, lowering their self-efficacy and imposing a further psychological barrier to successful Internet use."

Nevertheless, there are associations between such psychological characteristics and the socio-economic dimensions of the digital divide. Lack of confidence in Internet usage has a stronger negative effect on Internet use among low-income earners than high-income earners (Reddick, Boucher and Groseilliers 2000: 40). Studies show that women display somewhat higher levels of computer anxiety and technophobia than men (Igbaria and Chakrabarti, 1990), though other studies have been unable to discover such differences (Glass, Knight, and Baggett, 1985). Those disadvantaged are more likely to view computers and the Internet negatively. It is unclear whether this emerges from negative attitudes to technologies or is rooted in the experience of being excluded from those technologies. For example, the Cultural Access Group concludes, "Among all groups, online African Americans are the least likely market to believe that the Internet removes racial barriers and creates new social opportunities. African American and Hispanic respondents were nearly three times and five times as likely, respectively, then the general market to mention negative perceptions of the Internet" (Cultural Access Group, 2001b). The main conclusion I would draw is that there is an underlying psychological dimension to the Digital Divide that is complex and little understood; it deserves much more careful and extensive research before we can fully understand its relation to the so-called more "objective" dimensions of the Divide.

6. Educational

Education is one of the most studied and reported influences on the digital divide. Many commentators have also written about the effect of the digital divide on education, especially the effect of online distance education on inequalities in learning opportunities. In some ways education is at the heart of the Internet and the digital divide because of the importance to society of transmitting information and knowledge, even though many would argue that business, since the start of deregulation and privatization, is at the heart of the Internet.

In the two tables below, we show the variation in household Internet access in Canada and the United States by the head of the household. The Canadian figures in Table 16 are for 1997 to 1999. In each year, Internet access increases rather dramatically from less than high school to post-graduate education. The same pattern is evident in the United States in Table 17, despite the difference in methodology and education categories. Both tables also show an increase in Internet access over time within each education category.

Table 16: Percent of Canadian Households with Internet Access by Education of Householder, 1997 to 1999

Education	1997	1998	1999
Less than high school	9.0	12.6	16.1
High school / college	31.0	37.4	44.4
University degree	59.6	68.1	70.1

Source: Dickinson and Ellison (2000:8)

Table 17: Percent U.S. Households with Internet Access by Education of Householder, 1998 and 2000

Education	1998	2000
Less than high school	5.0	11.7
High school	16.3	29.9
Some college	30.2	49.0
Bachelor degree	46.8	64.0
Post-graduate	53.0	69.9

Source: NTIA (2000:11)

These educational effects are rooted not only in the type of learning and teaching that went on in schools, but also on the socio-economic characteristics of schools themselves. There are organizational educational effects that often reflect geographic differences in wealth and poverty. Schools in rich districts are more likely to have Internet access than schools in poor neighbourhoods. Many countries will have a kind of geographic and economic characterization of what might be called the "digital have school districts" and the "digital have-not school districts." National and regional state or provincial governments have recognized these differences and have mounted school connectivity programs to begin to equalize some of the differences between school districts. In the United States, schools with extensive free lunch program (reflecting their poorer neighbourhoods) and high minority enrollments have been less likely to be connected to the Internet, although the gap between such schools and wealthy schools has to a greater extent closed because of government Internet programs (NCES, 2001). Some of these differences even exist at the post-secondary school level. Wealthy and well-endowed colleges and universities are likely to have the financial resources to pay for the infrastructure for high-speed access to the Internet (Cuneo, 2000). Smaller colleges and universities are the digital have-nots and must make do with less bandwidth and more outdated computer resources.

Overarching these educational digital divide differences is the internationalization of distance education. Countries that are wired and have advanced distance education programs, especially in the developed North, are spearheading a global reach of their distance education programs into the developing and underdeveloped world. This has implications for the cultural hegemony of the West and North over the South. The creators of online distance education programs in the Global North define the curriculum, and what is important to learn and to know. This is a different kind of global bridge that represents an aggressive thrust of the North into the South by taking advantage of the educational divide on an individual and country level.

7. Economic

At the international or global level, there is a direct relationship between a country's wealth (measured by gross domestic product, or per capital income) and Internet access. This has resulted in the earlier noted digital divide between the rich developed North and the much poorer underdeveloped or developing South. The effect of this income disparity is reproduced inside each country. Within every country of the world, there are sharp differences in computer ownership and Internet access by income and wealth of individuals and households. As income rises, so do computer ownership and Internet access. As income declines, so do computer ownership and Internet access. This relationship is so strong, remarkable, and consistent that Small (1997) calls it the association between "economic stratification" and "computer stratification."

In Table 18, we show the relationship between income quartiles (fourths of the population divided by household income) and Internet access between 1997 and 1999 in Canada. In 1997, Internet access increases from 12.4% in the bottom income quartile to 53.7% in the top quartile. In 1998, Internet access increases from 13.2% in the bottom quartile to 65.1% in the top quartile. In 1999, Internet access climbs from 18.8% for the bottom quartile to 71.2% in the top quartile. One can also see in this table that Internet access increases within each income quartile from 1997 to 1999. All income groups have an interest in the Internet, though not for the same reasons. All cannot equally afford the hardware, software, and monthly Internet charges. Reddick, Boucher and Grosielliers (2000: 20) show that cost as a reason not having an Internet account increases from 17% among households with over $60,000 income to 26% for households less than $20,000 income. Each income level, however, has different interests or reasons for participating on the Internet. In Canada, education and business/work related reasons become a more important reason for having an Internet account as income rises. In other words, they are more important to high-income earners than low-income earners. In contrast, leisure and entertainment become more important reasons for having an Internet account as income decreases. Entertainment and leisure are more important reasons for Internet surfing for lower income households than upper-income households (Reddick, Boucher, Groseilliers, 2000: 19).

Table 18: Percent of Adult Canadians with Internet Access by Household Income, 1997 to 1999

Income	**1997**	**1998**	**1999**
Botton Quartile	12.4	13.2	18.8
Second Quartile	18.4	23.6	29.2
Third Quartile	32.8	41.5	48.1
Top Quartile	53.7	65.1	71.2

Source: Dickinson and Ellison (2000: 7)

The United States shows a similar pattern to Canada. In Table 19, I show changes in access of households by absolute income categories. In the year 1998, household Internet access rises from 7.1% for those householders making less than $15,000 to 60.3% for those earning $75,000 or more. In 1999, "households with incomes of $75,000 and higher are more than 20 times likely to have access to the Internet than those at the lowest income levels" (Cultural Access Group, 2001b: 7, citing US Dept of Commerce, 2000). In

2000, Internet access rises from 12.7% for those householders making less than $15,000 to 77.7% for those earning $75,000 or more. As for Canada, Internet access increases over time for each income category, as well as rising with income.

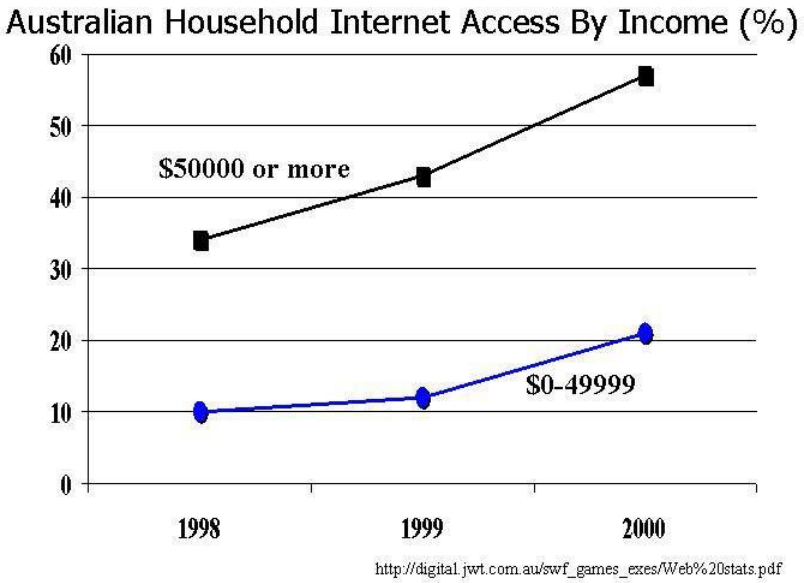
Table 19: Percent U.S. Households with Internet Access by Income of Householder, 1998 to 2000

Income	**1998**	**2000**
Under $15,000	7.1	12.7
$15,000-$24,999	11.0	21.3
$25,000-$34,999	19.1	34.0
$35,000-$49,999	29.5	46.2
$50,000-$74,999	43.9	60.9
$75,000 and over	60.3	77.7

Source: NTIA (2000: 8)

If we look at one other country in Figure 4, Australian household access to the Internet between 1998 and 2000 is twice as high among those making over $50,000 per year than those earning less than $50,000. Although both categories increased their income between 1998 and 2000, the income disparity showed little sign of closing (Australian Bureau of Statistics, 2000).

Figure 4:



Countries that have a deep divide between the rich and poor, or have deep income disparities, are likely to manifest a stronger relationship between income, and computer ownership and Internet usage. Besides income disparities, the strength of the relationship between income and computer ownership and Internet usage depends on a host of other factors. One of these is the cost of computer hardware and software, and Internet access. All three are declining over time relative to the power of the technology. One can now purchase more ram and greater microprocessor speed at increasingly less cost. However, these costs are not fixed in time or space. There are sharp international differences in cost

of access to the Internet. As noted earlier (in Table 8), these costs are often higher in poorer countries (because of the high cost of infrastructure) than in richer countries, further impeding the access to the Internet by the poor and "not-so-poor" in poor countries.

Is the income effect explained by the education effect considered earlier? Do higher income earners have greater Internet access because they have more education? Do lower income earners have less Internet access because they have less education? This reasoning makes sense because income differentials are somewhat based on education differentials. Educational credentials often control access to jobs, which affects income levels. The same logic should extend to Internet access. In fact, it can be argued that the highly educated might use the Internet to earn higher incomes, such as setting up one's own business on the Net.

However, while the data suggest that some of the income effect is explained by education, income and education seem to have relatively independent effects on Internet access. In Table 20, Internet penetration rises with overall income, from 18.8% among the bottom quartile to 71.2% among the top quartile (last row). Internet penetration also rises with education from 16.1% for those with less than high school to 70.1% for those with a university degree (last column). However, within each of the three education categories, Internet penetration rises by income. In other words, holding education constant, income still has a strong effect on Internet access. Similarly, for each of the four income quartiles, Internet penetration rises with increasing education. So, holding income constant, education still has an effect on Internet usage. Combined, these two social and economic characteristics have strong effects on the likelihood of Internet usage. For example, the extreme "digital have-nots" in this table are those with less than high school education in the bottom income quartile: only 7% in this extreme bottom cell has Internet access. Similarly at the other extreme, there is perhaps a pure type of digital-haves: 84.3% of those in the top income quartile with a university degree have Internet access. As I remarked at the beginning of this paper, outliers and exceptions intrigue me. Why and how, or what is special, about the 7% of those in the extreme bottom cell who do have Internet access? We expect almost all those with little education and little income not to have Internet access. Yet 7% in this category defy all odds and manage to obtain Internet access. How and why? Similarly, in the extreme upper category, although 84% have access, why and how is it that 16% of high-income earners with a university degree still do not have Internet access? All expectations are that they should have access. Yet they do not. Why? These questions on the complexity of the digital divide deserve further exploration.

Table 20: Internet Penetration Rates by Household Income and Education of the Head of the Household, Canada, 1999

Education of head of household	Bottom Quartile	Second Quartile	Third Quartile	Top Quartile	All Incomes
Less than high school	7.0	12.9	28.0	42.3	16.1
High school/college	25.8	33.2	49.0	67.6	44.4
University degree	49.3	51.5	64.0	84.3	70.1
All households	18.8	29.2	48.1	71.2	41.8

Source: Adapted from Dickinson and Ellison (2000:13)

8. Sociological

The sociology of the digital divide is quite extensive. Many would argue it includes much more than the two issues introduced in this sub-section: occupational stratification, and computer-mediated communications. However, we are more interested in issues of understanding than establishing disciplinary boundaries.

Occupation, Jobs, and Work/Employment

Sociologists study the labour market and occupational shifts as the economy makes a transition from primary to secondary to tertiary or service stages. With this shift into the new or digital Economy comes as greater organization of work around creating, producing, processing, distributing, and circulating information, data, and "bits of knowledge." In a sense, the manufacture and trading of digital or virtual commodities replaces the manufacture and trading of physical commodities. But this has not been an even or a random process. It follows specific occupational channels. Business, especially large corporations, and employees working in professional and managerial occupations, are more likely to be daily computer users than semi-skilled and unskilled urban and agricultural labourers.

All surveys show that the active labour force with full-time jobs have higher Internet usage than those unemployed or outside the labour force, and casual labourers. In the Year 2000, 58.4% of those in the active labour force in the United States between the ages of 25 and 49 used the Internet, compared to 39.3% of those in this age category not in the active labour force. The effect of labour force status is even more pronounced among older persons. Among those 50 years of age and over, 46% of labour force participants used the Internet compared to 17% of those not in the labour force (NTIA, 2000: 44-45). These labour force/ non-labour force differences in Internet usage are true across all gender, race, income, and education categories (NTIA, 2000: 57-58). However, the use to which the Internet is put varies by labour force status. The unemployed are more like to use the Internet than the employed for job searches and for taking courses, while the employed are more likely to use the Internet for information searches. There is virtually no difference in the likelihood of using the Internet for e-mail among the employed, unemployed, and those not in the labour force (NTIA, 2000: 118).

The occupations, jobs, and careers that have the most intensive computer use and Intranet and Internet activity are upper and middle management and trained professionals in higher education, information processing, software and the IT industry, telecommunications, publishing, government, and the scientific, financial, and health sectors. Those having the least use of computers and the Internet are labourers and temporary workers in agriculture, mining, utilities, wholesale, religion, homemaking, and hotel and food sectors. (GVU, 1998)

There are two unique situations that deserve comment. First, the information technology sector (the sector that produces the computer hardware and the software and Internet infrastructure), obviously has the greatest density of computer and Internet users. They also have a computer technology skill set which is the most advanced in the

economy. This sector might be said to be the heart of the occupational "digital haves". Second, perhaps ironically, some of the earliest computer users were not professional and technical males, but clerical women working initially as secretaries and typists, later as computer keypunch operators, and finally as word processors. Even though they were some of the most intensive computer users, we hesitate to call them the "digital haves". While they were moderately skilled using computer applications, such as word-processors and spreadsheets, especially compared to their immediate bosses, they were not well paid. More importantly, they were not part of the design team that fashioned the architecture of the next generations of computer hardware and software. They were "consumers at work" who toiled long hours in front of the computer terminal. Many of them suffered carpal tunnel disease because of the unbroken tedium of long hours without breaks at Video Display Terminals (VDTs). It is more correct to classify them as the "digital have-nots", even though they were frequent computer users.

Family: Internet marriages; networking and bonding. Inheritance

One aspect of occupational classes in sociology is endogamy or intimate friendships, sexual relationships, and marriage with one's social class peers. A person is more likely to be intimate with, or to marry, someone from one's own social class than from another social class, whether up or down the social ladder. Intimacy or marriage with members of adjacent classes is more likely than with distant classes, which is almost forbidden, leading to ostracism from one's class peers. Physical proximity, physical access, and face-to-face relationships are the hallmarks of intimacy, sex and marriage, whether within or between classes. How does this play out on the Internet in terms of the digital divide? The Internet expands the scope and extensiveness of within class relationships. Rather than being restricted physically to one's own immediate neighbourhood, school or college (which are gatekeepers of endogamous within-class intimacies), one can expand considerably one's search for a "classmate" globally across the Internet. The Internet opens up the potential of a much greater number of partners who fulfill the social requirements of the intimate search, regardless of whether they live in Canada, France, Nigeria, China, or Argentina (Batalova, 2000). These within-class virtual communities stretch around the globe, at least as far as the Internet transmission belt will carry one's e-mail messages, images, audio and video files. Face to face body language in traditional intimate relationships is replaced by non-verbal and out-of-body cultural cues as to one's class membership transmitted through computer- mediated communications. The spawning of Internet marriages, sexual identity experimentation on MUDS (Multi-User Dungeons or Domains), pornographic sites, and chat rooms are a testimony to the popularity of this virtual extension of traditional intimate peer class relationships (Schneider, 2000). We might call this the "Intimate or Endogamous Digital Divide" separating the "Intimate Virtual Haves" from the "Non-Intimate Non-Virtual Have-Nots." Those connected to the Internet, especially those with high speed access, are able to avail themselves not only of the time online at affordable costs required to nurture intimate relationships, but also the bandwidth necessary to send and receive images, audio, and video files. The "digital-haves" are able to access a virtual intimate playground denied to the "digital have-nots". In the middle perhaps are those with text-only access. Their imagination can play an important role in filling in the possible class cues of their prospective Internet mates. But those with no access to the Internet are restricted to the traditional physical neighborhood, school and workplace in seeking out intimate

friendships and long- term marriage partners. Thus, there is available to the "digital-haves" an extensive within- class network of global intimacy denied to the "digital h ave-nots". Of course, there is nothing impeding experimentation with inter-class relationships across the Internet. This has taken exploitative and racist overtones as males from an upper class of fairly "digitized have countries" (e.g. Australia) utilize the Internet to search for visible minority women from lower often non-digital have-not classes in other countries (such as the Philippines) (Cunneen and Stubbs, 2000; Riddenhour-Levitt, 1999). But once again, this is an opportunity possessed by the "digital haves" that is denied to the "digital have-nots."

9. Labour

There are two perspectives on a labour approach to the digital divide. One centers on technology skills inside the workplace, and the other centers on labour costs in the production of computer technology and peripherals under an "international division of labour."

Technology in the workplace has been viewed as embedded knowledge. Whoever has control of that knowledge has control of the labour process within the workplace (how work should be organized and structured). The history of struggles over control of workplace technology is really about control over knowledge and skills critical to the production process. In the 18th and 19th centuries, much of this knowledge was in the hands of craft workers. They took pride in their specialized skills and control over the manufacture of an entire product, from initial conception to finished commodity. However, with the increasing capitalization, rationalization and bureaucratization of industry and the workplace, managers sought to gain control over this knowledge by incorporating it into machinery under their direction. This would allow them to reorganize the labour process, and subdivide work into semi-skilled components under their more immediate control. Overall control of knowledge would be transferred from craft workers to managers. This has come to be known as the detailed division of labour under Taylorism (Braverman, 1974). Space limitations do not allow me to go into the history or theory of the struggle over technology in the workplace.

Computerization of the workplace is the most advanced form of this struggle for control over technology and knowledge of the labour process. This has led to a digital divide inside the workplace. Managers and professionals, under a capitalized private property regime, are "workplace "digital haves," and semi-skilled and unskilled workers are workplace "digital have-nots." The proletarianization of women and visible minorities under this regime is partly rooted in such workplace computerization. This is a qualitatively different dimension of the digital divide than what I have considered so far in this paper. It is a digital divide based, not solely on income, or education, or ethnicity in society at large, but on the social relations of production under advanced capitalism inside the workplace. In a sense, it is the hidden or the underside of the global digital divide.

With respect to labour costs in the production of computer technologies under an international division of labour, consumers in the North or advanced capitalist societies have benefited from the parallel fall in the cost of computer components and the rise in

microprocessor speed. Rarely do consumers ask how this is possible. One answer lies in the globalization of the production and distribution of computer parts. Even though the headquarters of most computer companies are in the North and West or in developed Asian countries (Japan, South Korea, Taiwan), much of the production work is done by "cheap labour" in developing and underdeveloped countries in Southeast Asia, Latin America, and other parts of the South. One notable example is China, especially the Guangdong area near Hong Kong. Many Tawainese computer companies have been moving their production units from Taiwan and Malaysia to China. A major reason is the relative labour costs. The "labour cost of producing a monitor is $10 in Taiwan, around $7 in Malaysia, but only $3 in China." Within Guangdong province, "Dongguan produces 60 billion dollars of IT related products a year."[20] In the year 2000, China produced a staggering $25.5 billion in electronic products.[21] One example of the international divisions of labour in computer parts is the hard disk drive industry. In 1996, American firms controlled 85% of the market share of this industry. However, 64% of world final production or assembly, and 67% of employment, are located in Southeast Asia, primarily in Singapore, Malaysia, Thailand, and China. The primary reason is low wages. Hourly wages in 1996 were: Malaysia $1.59; China $ 0.25; Singapore $7.28; Thailand $0.46; United States $17.20. High-skilled labour, high wages, and design work are located in the United States; unskilled work is located in Southeast Asia. In effect, this is a global/local digital divide that has been created inside the computer industry. It is the underbelly of the global digital divide I outlined earlier under the geographic section.

10. Cultural

I would like to introduce four aspects of the cultural digital divide: inequality of access in terms of race and ethnicity; racial differences in online usage; linguistic diversity; and the cultural underworld of computing.

Race and ethnicity

Colin Powell refers to the digital divide as "digital apartheid" (Business Week, 2000). What did he mean by using this emotive term? Race and ethnicity vary tremendously by country and to a great extent are defined uniquely by national context. A group dominant in one country may find itself in a minority position through the process of immigration and subordination in a new host country. Cultural attitudes towards technology, as well as racial and ethnic discrimination, can act as barriers to greater access to the Internet. Race and ethnicity tend also to be highly correlated with other socio-demographic variables, such as education and income, which are known to have strong effects on the digital divide. But once these associated variables are controlled, race and ethnicity continue to have an independent impact on Internet access. This is what Colin Powell was referring to in the use of the term "digital apartheid."

When we compare actual web users, the racial homogeneity of the web becomes pronounced. Comparing Europe and the United States, we see in Table 21 that more than 85% of all users who filled out the GVU online web survey were Caucasians or Whites. In Europe, 93% were whites/Caucasians; in the United States, 88% were whites or Caucasians. Other racial groups are barely visible among users who filled out the biannual surveys.

Table 21: Percent of Web Users Belonging to Racial Groups in Europe and the United States, 1998

	Europe	United States
Whites/Caucasian	93.2	88.1
African-American	0.0	2.3
Indigenous	0.0	0.3
Asian	0.8	2.1
Hispanic	0.0	1.4
Latino	1.4	0.4
Multiracial	0.8	1.6
Other	1.6	1.4
Not say	2.2	2.5
Total	100%	100%

Source: GVU 1998 Web Surveys
http://www.gvu.gatech,edu/user_surveys/survey-1998-10/graphs/general/q48.htm

When we turn from online users to who has access, in the United States, Asian-Americans and Pacific Islanders have consistently had the highest Internet access of all racial groups (see Table 22). Between 1997 and 2000, their Internet access rose from 25% to 57%. In each year, their level of Internet connectivity was the highest. Whites were the second highest, followed by blacks and Hispanics. The greatest gap occurs between Asian-Americans, Pacific Islanders, and whites on the one hand, and blacks and Hispanics on the otherhand.

Table 22: Percent U.S. Households with Internet Access by Race/Hispanic Origin of Householder, 1997-2000

	Asian- American & Pacific Islanders	White	Black	Hispanic
2000	56.8	46.1	23.5	23.6
1998	36.0	29.8	11.2	12.6
1997	25.2	21.2	7.7	8.7

Source: NTIA (2000:00) http://www.ntia.doc.gov/ntiahome/fttn00/chartI-10.htm
http://www.ntia.doc.gov/ntiahome/fttn99/FTTN_I/Chart-I-23.html

Given the high association between race and income, we can ask whether race and income are separate and independent in their effects on the digital divide. Do racial differences in the digital divide hold up within different income groups? Or does income weaken the racial impact on Internet access? Table 23 shows the percentages of U.S. households with Internet access by race and income. A close inspection of the table reveals that within each income category, we get the same pattern of racial differences in Internet access: Asian-Americans and Pacific Islanders are the highest, followed by whites, and then by blacks and Hispanics. Within each income category, we get the same contrast between two sets of groups: Asian-Americans and Pacific Islanders and whites on the high end, and blacks and Hispanics on the low end. With respect to computer ownership, Pinkett (2000) finds that even among blacks and whites at the same level of income, blacks have a lower computer ownership than whites. Additionally, income has the same pattern within each racial group: the greater the income within each racial category, the more likely that the racial group is likely to have Internet access. The conclusion is that race and income are relatively independent dimensions of the

digital divide. We built a bridge between income and race, but discovered that we cannot merge the two dimensions across the lateral divide. However, it seems that race has a greater effect on Internet access among low-income groups than high-income groups. Income may serve to erase some of the racial differences in Internet access among high-income earners.

Table 23: Percent U.S. Households with Internet Access by Income and Race/Hispanic Origin of Householder, 2000

	Asian- American & Pacific Islanders	**White**	**Black**	**Hispanic**
Under $15,000	33.2	16.0	6.4	5.2
$15,000-$34,999	43.8	31.0	17.9	17.7
$35,000-$74,999	60.7	56.7	38.7	41.5
$75,000 and over	81.6	78.6	70.9	63.7

Source: NTIA (2000:00)

There are also other more subtle aspects in the racial digital divide. Blacks and Hispanics are not only less likely to go online than Asian-Americans and whites, but they are less likely to access the Internet from private locations, such as their homes. Since they are less likely to own computers and thus to have access to the Internet from home, they are more likely to access the Internet from public places or from work. In a study by Forrester Research, 63% of Hispanics "go online at work, while 59% of all Internet users do so, and 24% go online at a friend's or relative's house, in comparison with 13% of all users."[22] This is similar to the pattern we noted earlier of individuals in third world countries more likely accessing the Internet from public points (cybercafes) outside their home. Public access (or access outside of one's private household) and low income appear to go hand in hand. Minorities might also connect more often via wireless devices. 8% of African-Americans connected to the Internet through a wireless device compared to 3% of the general population.[23] Under the international geographic section earlier in this paper, we noted that third world underdeveloped countries might leapfrog into the Internet age by skipping the fiber-optic stage and going directly to wireless access.

Online Usage by Minorities

At the beginning of this paper, I referred to Atewell who wrote about a second digital divide. Rather than differences in getting access to the Internet, this refers to differences once online, or differences between socio-economic groups in online behaviour. It has been argued that the digital divide is much more than about inequality of access. Behind this inequality lay "cultural drivers" dealing with cultural sensibilities and identities that influence how the Internet is used, what kinds of web sites are visited, and what kinds of search content is preferred. Once connected to the Internet, the behavior of the user may change dramatically. The "have-nots' may become very active users of the Internet.

In a 2000 Pew survey of adult Americans, 75% of English-speaking Asian-Americans use the Internet, compared to 58% of whites, 43% of African-Americans, and 50% of English-speaking Hispanics (Spooner, 2001; CyberAtlas, 2001a). Among those who use the Internet, Asian-Americans are heavier users. 70% of Asian-American Internet users

go online every day, compared to 57% of whites, 48% of Hispanics, and 39% of African-Americans (Spooner, 2001: 5). However, these differences exist only between 18 and 34 years of age; among older people, whites are heavier Internet users than Asian-Americans (see Table 24). The high figures for young Asian-Americans do not seem to be explained by their high average household incomes, or their relative youth, both factors known to be correlated with high Internet usage. Interestingly, young Hispanics and African-Americans are heavier users than whites.

Table 24: Race and Age of Internet Users (2000) (USA) (percentage)

Age	Overall	Asian-Americans	Whites	African-Americans	Hispanics
18-24	17	28	15	26	30
25-34	24	35	23	28	31
35-44	26	22	27	25	23
45-54	19	8	21	15	11
55-64	9	5	10	5	3
65+	4	2	5	1	2

Source: Pew Internet Tracking 2000 Poll (Spooner, 2001)

Minorities are less likely to have access to the Internet but are more likely than whites to take online distance education courses. "About 37% of white Americans reported taking online courses in 1997; by comparison, 50.3% of Latinos, 47% of American Indians/ Eskimos/Aleuts, and 46.3% of African-Americans were learning online" (Lara et al, 2001: 55, citing U.S. Dept. of Commerce 1999 study). In a survey of 26,000 U.S. adults by Pew Internet & American Life Project, "Asian-Americans are more likely than Caucasians, African-Americans, and Hispanics to get news, financial information, travel information, hobby information, and political news online. Compared to other races, Asian-Americans are more likely to do education-related research online in a typical day and to do work-related research online" (eMarket, 2001).

The "ethnic market" is seen as a vast opportunity to make money by selling goods and services across the Internet to ethnic and racial minorities. "Michael Dinkins, Chairman and CEO of Access Worldwide, stated, "With a growth rate double the general market and more than $600 billion in annual buying power, multicultural markets have continued to catch the attention of companies from all industries."[24] For e-Companies to capture this market, at least three conditions must be satisfied. First, racial and ethnic minorities must connect to the Internet at relatively high speeds. Second, corporations must understand the cultural tastes and spending habits of the ethnic market, and translate them into marketing strategies. Third, minorities must have sufficient trust of the Net that they are willing to give their credit card number online. However, racial minorities are less likely to give their credit card number online or to purchase goods online than whites. "Only 16% of all users said they would not be comfortable using their credit card to buy online, while 49% of African-Americans and 38% of Hispanics were uncomfortable at the thought of using their credit card at an e-Commerce site (Cultural Access Group, 2001). Corporations are anxious to understand the conditions under which minorities on the "other side" of the digital divide can be induced to participate in the e-Commerce market. Hence corporations sponsor studies into the online consumer habits of African-Americans and Hispanics. "African Americans focus their Internet activities

more on career advancement and professional development, family/relationship themes, education, entertainment, and exploring hobbies and interests. Online Hispanics overwhelmingly use the Internet as a major source of news content, particularly international news. Unlike the general market, both groups are less likely to seek financial or technological information online" (Cultural Access Group, 2001b). With the exception of online banking, there is less online commercial behaviour by minorities, especially in the purchase of stocks. However, "Hispanics are more likely than white users to have used online banking, browsed the Net for fun, downloaded music, played online games, and sampled audio and video clips. They are as likely as whites to have bought stocks online, but less likely to have bought goods or services online, or bought or sold in an online auction."[25] "Cyber Dialogue advises online advertisers to target African-Americans, because 66% click on online ads, and they are more likely to consider online ads helpful, and less likely to think they all look the same".[26] Entertainment web sites attract Hispanics more than whites. "Online Hispanics are more likely than all online adults to click on ads but they are less likely to shop online and more likely to buy things offline after seeing them online. Two-thirds of Hispanic users regularly visit entertainment sites and Cyber Dialogue suggests that marketers wishing to reach a Hispanic audience should target these sites."[27] Corporations face an uphill battle in inducing ethnic and racial minorities to purchase goods online. It is somewhat ironic that corporations, which are viewed as helping to perpetuate the digital divide, might be engaging in market selling tactics to minority markets in such a way that the ethnic and racial digital divide might weaken as a result. The market or money might form a rung on the ladder connecting the racial "digital have-nots" with the "digital-haves."

Linguistic Diversity?

It has been estimated that there are about 6,000 languages in the world, ranging from a low of 3,000 to a high of 10,000, depending on how linguistic boundaries are defined. However, only 4% of the world's population speaks 96% of these languages. Every two weeks, a language disappears as its last surviving spokesperson dies. Between 50% and 90% of the world's 6,000 languages could disappear in the next century. By the middle of this century, there may remain only five major languages: English, Spanish, Arabic, Chinese, and Hindu/Urdu (Cunningham, 2001). Language death is accelerated by unequal contacts between linguistic groups, especially between conquerors and the conquered, between superiors and inferiors, and between haves and have-nots. Communications can preserve or destroy languages, depending on the relationships among language groups and the relative power of their social and national bases.

One such communication is electronic via computers and the Internet. In the past, it has usually been argued that the Internet was an Anglo-American phenomenon dominated by the English language and western values. Even as non-English developing countries came onto the Internet, it was often their English-speaking upper-middle professional and highly educated classes who were the first onto the Internet. They had little difficulty operating in a language in which many of them were educated. Not only was English adopted as the "language of technology", it began to corrupt other languages. There have been complaints over the rise of "Spanglish". Online Spanish sites began to use English equivalents for Spanish words. The English word "software" is used instead of the Spanish "programa," "PC" is used instead of "computadora." New anglicized words

such as "aplodeur" for "upload," "chatear" for "chat," "printear" for "print," began to appear in Spanish.[28]

In 1996, the Internet Society's survey of 60,000 computers in the world with Internet addresses found that 82% of web home pages used English, followed by German (4%), Japanese (1.6%), French (1.5%), and Spanish (1.1%). Other experts have found that 90% of Internet sites are in English. "A study by the Agence de la Francophonie, Union Latina, and the NGO Funredes found that English is still the language that appears most frequently on the Internet at about 75%, while French accounts for 2.8%, Spanish 2.5%, and Italian 1.5%" (Rodriguez-Alvez, 1999).

WorldLingo did a survey in which it sent e-mail messages in German, French, Italian, Portuguese, Spanish, or Japanese to each of the top 50 web sites, such as Microsoft, Yahoo, AOL Time Warner, Amazon, Walt Disney, and eBay. Only 4.54% of such companies could respond accurately to a non-English email message. "Most of the target companies did not even answer the email request. Those that did answer often asked for the email to be re-sent in English" (WorldLingo, 2001). The contradiction is that approximately 86% of web pages are in English, yet less than half of Internet users speak or write in English. 43% of Internet users speak English; 57% speak a non-English language, divided between 32% who speak a non-English European language (French, Dutch, Finnish, Greek, Italian, German, Italian, Polish, Portuguese, Russian, Danish, Norwegian, Swedish, Slovak, Turkish, or Spanish), and 25% who speak an Asian language (Arabic, Hebrew, Chinese, Malay, Japanese, Korean, or Thai) (Global Reach, 2001). Websites had the least difficulty with Spanish (21% responded to a Spanish email). This is probably due to the large number of Hispanics in the United States, and the importance of this market to companies selling on the Net. Broken down by industry, none of the entertainment web sites could respond to a non-English message. This is perhaps a symbol of the complaints in other countries regarding the cultural hegemonic reach of the American entertainment industry across the globe.

Lavoie and O'Neill (1999) studied changes in the linguistic diversity of public websites between 1998 and 1999 as a measure of the increasing internationalization of the World Wide Web. Their main conclusion is that, although English predominates by a wide margin, there have been modest increases in non-English and multilingual websites. The United States accounted for 59% of the web sites in 1998, and 55% in 1999. Four English-speaking countries (United States, Australia, Canada, and United Kingdom) accounted for 70% of the web sites in 1998, and 67% in 1999. There was a slight increase by 13% in the number of languages on the web: from 24 in 1998 to 27 in 1999. However, in both years only 8% of the websites could be classified as multilingual (more than one language). English accounted for 84% of the websites in 1998 and 80% in 1999. In 1999, the other languages were German (7.5%), Japanese (3.6%), French (3.2%), Spanish (2.8%), Portuguese (2.6%), Italian (2.0%), Chinese (1.7%), and Dutch (1.2%). Lavoie and O'Neill examined the distribution of multilingual sites by the predominant language of the country hosting the website. They found that websites in non-English speaking countries were far more likely to be multilingual than sites from English-speaking countries. For example, 46% of the websites in Russia were multilingual; this

was followed by France, Hong Kong, Hungary, Japan, Portugal (33%), Italy (32%), and China (31%). At the bottom of the multilingual website ranking were two English-speaking countries with a very strong web presence: Canada (5.3%) and the United States (1.5%). This gives a good indication of the pervasiveness of the English language on the web. Given that most people prefer to interact with websites in their own language, and in many cases simply cannot function in a non-native language, language becomes an important barrier to the rapid internationalization of the web. This may be the reason unilingual French-speaking Canadians use the Internet less than English-speaking Canadians, though there is less broadband in Quebec than in other parts of Canada.[29] It serves to reinforce and maintain the digital divide. Most English-speaking countries are "digital haves;" most non-English speaking countries are likely to be found among the "digital have-nots."

As the Internet moved from a small academic and hi-tech elite to a mass phenomenon, and as large population segments from non-English countries began to access the Internet, the total proportion of Internet users who were living in North America and Western Europe began to stall and to decline; the proportion coming from non-English countries, especially from Asia, began to increase. In its 2001 *Face of the Web Report,* IPSOS-Reid, the international polling firm, noted that the proportion of all Internet users from the United States declined from 40% in 2000 to 36% in 2001 (IPSOS-Reid, 2001). The proportion (34%) coming from Western Europe and other English-speaking countries (Canada, Australia, United Kingdom, urban South Africa) rivaled those from the United States. Sweden and Canada surpassed the United States in the highest proportion of Internet users. IPSOS-Reid noted: "Though the U.S. still by far has the largest single user base, non-Americans now outnumber Americans on the Internet by a clear margin. The World Wide Web is showing signs of breaking away from the dominance of English, American-derived content. Users are increasingly able to find what they need in their own language on local sites. In each country, local content will play a role in converting the less frequent users into heavy users. … In every global region where English is not the main language spoken, nine-in-ten Internet users prefer to get local information in their own language." Some observers have predicted that by 2007, Chinese will outrank English as the dominant language on the Internet (McCarthy, 2001).

International companies have started to take note of the problem of English-only sites, and have discovered that consumers are four times more likely to buy a product online in their own language. The International Data Corporation (IDC) argues that companies will have to adopt a more linguistically diverse web and e-Commerce strategy if they hope to sell into a global market. Its survey suggests that Western Europe and Asia will develop an Internet presence on a par with the United States. "The accompanying shift of language usage away from English will be dramatic." An English-only web presence will hurt sales. An IDC survey, consistent with many others and the ones cited previously, shows that 80% of Internet users prefer websites in their own language. Based on a weighted ranking of languages in business-to-consumer e-Commerce, it suggests the development of a linguistic strategy tailored to the particular region of the world into which companies hope to sell. "English ranks first in North America, Western Europe, and Asia/Pacific. Japanese ranks first in Japan, and Spanish ranks first in Latin America." They suggest that the dominant languages in the global e-Commerce market are English,

Spanish, French, German, Japanese, Brazilian Portuguese, traditional Chinese, and Korean (McClure, 2001).

In warning American companies against complacency in developing multilingual sites to market globally, Bill Dunlap, Managing Director of Euro-Marketing Associates, argues: "Going global is no longer considered as an alternative but a necessity for business survival. If your business has not gone global, you can bet that your competitors have a plan to get there, regardless of their geographic location. Today, there are only 7 countries where English is the primary language spoken … and where the combined economies represent 30% of the world's economy. The combined populations of these countries represent 8% of the world's population. Companies that continue to target this small fraction of the world market will miss out on capturing a large potential market. There's a big world outside of English-speaking countries, and if companies don't translate their website, they pave the way for aggressive competition for international business from other countries" (Dunlap, 2001).

In the past, language might have been seen as one of the barriers reinforcing the digital divide. However, to the extent that capitalism and the quest for markets will force a more multilingual Internet strategy, in the future language might be a critical building block in the construction of ladders from the non-English speaking digital have-nots to the English speaking digital haves. It is not so much that the English language is obliging other languages as other languages simply overtaking English because of the sheer size of their population base and the interest by corporations in the markets of their countries.

Cultural Underworld of Computing

What is the content that resides on computers? They are software application programs as well as data, sound, image, text, and video files. They are expressed in a digital (1,0) symbolic format. This symbolism has meaning linguistically, culturally, and virtually within a restricted milieu. Some cultures may by tactile and communicate orally, or in writing on tablets or paper, and not be able to cope with online virtual and digitized formats and communications. Digitized cultural content is abstract symbolism, which may be foreign to some cultures and language groups.

It can be argued that the Internet was conceived and deployed by a small professional corps of experts, and technicians, sharing a similar cultural worldview, common assumptions, a language of communication, and similar lifestyle. "Computer Nerds" is the slang description of this unique group. By definition, it excluded anyone who did not happen to partake in, or understand, this esoteric cultural underworld in the interstices of cyberspace. The excluded were in fact the vast majority of the world. This cultural *modus operandi* forms the substratum of a kind of intra-class network of experts. They have cultural rules of communication, called protocols, which are "special set of rules that end points in a telecommunication connection use when they communicate. … Both end points must recognize and observe a protocol."[30] The most widely accepted protocol today is called TCP/IP (Transmission Control Protocol/Internet Protocol). Rules are established for how messages are broken up into packets, which find the most efficient route to their destination address where they are reassembled. This world inhabits a cultural space of

virtual addresses, distances, rules for addressing, and assumptions about out-of-body communication. It is foreign to many "digital have-nots" in both the First and Third worlds. But it has given this techno-cultural elite the knowledge base to build a powerful global network that spans space and time, often enriching those with "secret understandings," and impoverishing the rest of the world. A central relation in this network of networked computers is that between a client and a server. The server houses and controls digital information, which is served to the client computer after it makes a request according to strictly defined protocols. It is not too far fetched to suggest that the server is in the hands of small cores within the "digital-haves," and the clients are everyone else. The clients may be in the interstices of a precarious digital existence. They may be home users who send out requests for information across the Internet, rather than "serving up the information," regardless of the ease of hosting web pages. They may have moderately high education, but have modest incomes and may be a visible minority. They may have a precarious link to the Internet that lasts as long as their computer holds out, and does not crash. Because of costs, they are unable to replace one broken computer with another one. They are the "information have-nots" asking for information from the "digitally-privileged." In some sense, the client-server relationship is a cultural class information relationship, backed up by privileges of property and ownership rights to property. The instantly wealthy dot.com kids, all the way from Bill Gates to small software and startup Internet companies specializing in market niches, have been extensively written up in the Media. It is perhaps not too far fetched to suggest that this small cultural elite of young computer nerds has created a "digital have" island, and has converted its cultural-technical skills into millions, if not billions, of dollars in capital returns. Lacking a social conscience, it was never concerned with anything called a digital divide. In fact, Bill Gates from Microsoft, the largest software company in the world, is quoted as saying that he does not believe a digital divide exists and that it is a mere fantasy of naysayers. Nevertheless, the dot-com elite built a very powerful cultural class at the top of the digital world and became complete cultural foreigners to the majority of the people of the world, or the 92% of the world's population that forms the "digital have-nots." Perhaps out of guilt and perhaps because of an interest in a much larger global marketplace, some of these companies, such as AOL Time Warner, Microsoft, Sun Microsystems, and Oracle, have started to engage in a philanthropy aimed at easing the severity of the digital divide by contributing expertise, equipment, and software to the "digital have-nots" in the Third World.[31]

11. Disabilities

Disabilities are defined as "limitation in the ability to work: those respondents reported to have a "health problem or disability which prevents them from working or which limits the amount or kind of work they can do are counted as having disabilities" (Kaye, 2000). The American Association of Disabilities gives a somewhat different definition. It defines "a person with a disability as one who has a physical or mental impairment that substantially limits one or more major life activities" (NTIA, 2000: 62). The U.S. Bureau of the Census estimates that in 1999, 21.8% of the U.S. population aged 16 years of age or more had a learning or physical disability. This includes difficulty with walking or using hands, vision or hearing problems, or a learning disability (NTIA: 2000: 63).

In the United States, 23.9% of persons with a disability have a computer in the household, compared to 51.7% of the national population (Kaye, 2000). 10% of persons with a disability have access to the Internet, compared to 38.1% of the national adult population (Kay, 2000: 1998 figures). The NTIA (2000: 65) estimates that 21.6% of those with a disability have Internet access compared to 42.1% of those with no disabilities. The disabled "digital have-nots" are more likely to be isolated and confined to the home than the non- disabled. This even affects those who use computers. Of those who use computers, 46.5% of the disabled use a computer at home but not at work; only 31.7% of those with no disability but using a computer fall into this category.

There are differences in types of disabilities. Physical impairment is more of a hindrance for Internet access than learning disabilities. Those with learning disabilities have Internet access of 31.2%, compared to 21.3% with hearing problems, 17.5% of those having difficulty using their hands, 16.3% with vision problems, and 15% with walking problems (NTIA, 2000: 61, 65).
The disability digital divide is partially but not entirely explained by inequalities in age, education, income, race, and employment (NTIA, 2000: 67-87). The disabled have substantially less income, are somewhat older, and are less likely to be employed than those without a disability. All three of these factors independently affect computer use and Internet access.

Education

- Among persons with less than high-school education:
  12.7% of the disabled have a household computer compared to 34.5% of those with no disabilities;
  2.4% of the disabled have Internet access compared to 22.5% of those with no disabilities.
- Among persons with high school education:
  27.2% of the disabled have a household computer compared to 49.0% of those with no disabilities;
  11.3% of the disabled have Internet access compared to 33.1% of those with no disabilities.
- Among college graduates:
  46.5% of the disabled have a household computer compared to 73.4% of those with no disabilities;
  30.2% of the disabled have Internet access compared to 63.9% of those with no disabilities.

However, education still makes a difference regardless of disabilities. Among those with a disability, computer ownership rises from 12.7% of those less than a high school education to 46.5% among college graduates; and, Internet access rises from 2.4% of those without high school to 30.2% among college graduates. Similar increases occur among those without a disability.

Income

- Among persons with less $20,000 household income:
  11.1% of the disabled have a household computer compared to 22.2% of those

with no disabilities;
4.9% of the disabled have Internet access compared to 19.0% of those with no disabilities.

- Among those with $20,000 or more household income:
  40.0% of the disabled have a household computer compared to 61.2% of those with no disabilities;
  16.6% of the disabled have Internet access compared to 45.2% of those with no disabilities.

Even though the disabled have lower incomes than those without disabilities, income and disability have independent effects on computer ownership and Internet access. Not all of the disability effect is explained by income. Income continues to have effects on computer ownership and Internet access among both the disabled and those without disabilities. Among the disabled, computer ownership rises from 11.1% for those earning less than $20,000 to 40% for those earning $20,000 or more. Internet access rises from 5% to 17%.

Race and Ethnicity

Disabilities, race and ethnicity have independent effects on computer ownership and Internet access.

- Among whites:
  26.8% of the disabled have a household computer compared to 50.2% of those with no disabilities;
  13.3% of the disabled have Internet access compared to 30.7% of those with no disabilities.
- Among Asian/Pacific Islanders:
  37.8% of the disabled have a household computer compared to 56.9% of those with no disabilities;
  19.7% of the disabled have Internet access compared to 35.9% of those with no disabilities.
- Among Hispanics:
  19.0% of the disabled have a household computer compared to 32.7% of those with no disabilities;
  8.5% of the disabled have Internet access compared to 14.6% of those with no disabilities.
- Among African-Americans:
  10.7% of the disabled have a household computer compared to 26.3% of those with no disabilities;
  4.8% of the disabled have Internet access compared to 11.4% of those with no disabilities.

Disabled African-Americans experience the lowest computer ownership (10.7%), and the abled Asian/Pacific Islanders experience the highest computer ownership (56.9%). The same pattern exists for Internet access. Disabled African-Americans experience the lowest Internet access (4.8%), and the abled Asian/Pacific Islanders experience the highest Internet access (35.9%). This is partly due to the comparatively high education and income of Asian/Pacific Islanders, and the comparatively low education and incomes among African-Americans. Without further analyses, it is difficult to say whether disability or

race and ethnicity have the greater effects on computer ownership and Internet access.

Disability is an issue that is often excluded from consideration in discussions of social inequality. Yet given its widespread nature and debilitating effects on Internet access, with consequent implications for the participation by the disabled in a knowledge-based economy, it needs to be brought much more to center stage in such discussions. No more significant ladder between the "digital-haves" and "digital have-nots" can be built erected than in the area of disability. Considerable advances are being made in government support programs, and the development of adaptive technologies in the private sector. These are opening new areas of communication to the disabled that they would have been without before the age of the Internet. To the extent that the disabled have the financial resources to get access to such adaptive technologies, the digital divide may be broken down, piece by piece.

12. Political

Power is a core concept in the politics of the digital divide. There are two perspectives on the political nature of the digital divide. One is the use of the Internet by governments to protect, maintain or enhance their own political power; the other is the use of the Internet to carry out some kind of political protest against those with greater power and authority, whether in government or in corporations. This is usually a protest by "digital have-nots," or disaffected "digital haves," against the more privileged "digital haves." Each one will be considered in turn.

Maintenance of Political Power

The Internet is a means of exercising power, and maintaining the entrenched position of political rulers. The upper digital classes are the digital rulers; they have power based in economic and political institutions in society, or directly in the information and communications industry. They project this power across the digital political divide as a means to maintain or enhance their own power. Governments, as indirect digital rulers, use the Internet in four primary ways.

First, during political elections, political parties use the Internet to organize their campaigns and to sell their parties to potential voters. Major parties, and those that are incumbent in government, spend considerable resources on their Internet campaigns. Very few major political parties in the developed North and West do not have web sites.

Second, once in power, political parties, through the government, employ the Internet to more efficiently deliver administrative services. Citizens in developed capitalist countries are being exposed to the fact that they now have to access many government services electronically through the Net, such as applying for birth certificate or driver's license, doing their annual taxes, contacting their members of parliament or Congress, etc. We are on the verge of electronic balloting in electing members of government, regardless of the debates over participatory e-democracy (London, 1994).

Thirdly, governments use the Internet to project their own power globally around the world. They are starting to see the Net as a critical tool in the global fight to stay competitive economically with other countries. This can include such diverse activities as

hosting global export market services for national companies, sponsoring the digitization of national cultural heritage, and sponsoring the internationalization of their knowledge and information treasures through distance education and training programs marketed to underdeveloped and developing countries.

Fourth, a number of governments see the Internet, not as propping up their power, but as threatening to erode it. They are therefore taking measures to restrict the Internet, or to ban it altogether. Because they represent an interesting case of trying to control what many see as an uncontrollable media, I will go into some depth in discussing this point. Some countries in the world ban the Internet on religious, cultural, or linguistic grounds, or at least seek to limit its access and use. Before September 11, 2001, the Taliban in Afghanistan prohibited its citizens from accessing the Internet on religious grounds. The Taliban condemned the Internet for its "obscenity, vulgarity, and anti-Islamic content."[32] Saudi Arabia uses advanced blocking equipment to carry out its ban of over 200,000 web sites on the grounds that they are pornographic, anti-Islamic, or contain criticism of Saudi Arabia, the Royal Family, or other friendly Gulf countries.[33] The Malaysian government is "cracking down on sacrilegious web content." It prosecutes Muslims who post content on the Net that is critical of Islamic teachings, or who access pornography.[34] China has attempted to control the content of websites and chat rooms. The Chinese government makes information technology companies "responsible for preventing 'subversive' content entering China via the Internet. Subversive content includes any that harms the reputation of China, supports independence for Taiwan, or provides information on cults." It has closed down websites belonging to the Furlong Spiritual Group and the China Democracy Party. Except during the October 2001 visit of President Bush of the United States, it has blocked access to foreign web news sites such as Yahoo, CNN, and BBC, and it requires that owners seek approval for publishing news content on their websites. It bans "anything that is against the constitution, threatens state security, or harms China's reputation." China has also sought to regulate cybercafes, especially in Shanghai, by closing down half of them, and insisting that they use special monitoring software and identity cards for customers that allow the government to track who uses the cybercafes, and the sites they visit. China is able to easily control access to the Internet by controlling the gateways to the Web.[35] Similarly, Laos seeks to ban Internet content critical of the Government. In the daily newspapers, it publishes a list of banned Internet activities, such as "incitement to protest against the government, data and/or copyright theft, the import and export of pornographic images, publishing national secrets, and promoting activities that might disturb the peace and happiness of the Lao People's Democratic Republic."[36] It is difficult to gauge the effectiveness of such restrictions on Internet access by citizens from traditionally "digital have-not" countries. Their more creative and skilled citizens will find ways to circumvent "the authorities." At the very least, though, these restrictions form a type of harassment that cannot be too encouraging for "newbies" in such countries who would like to access the Internet for the first time in their lives.

We must not think that it is only the Third World that bans Internet content, or that this is the only reason why there is low Internet access in developing countries. We should equally deal with the case of banned Internet content in developed countries. For example,

in 1999 Australia passed a law giving the Government the powers to ask ISPs to remove content from their web sites that it considers "offensive or inappropriate."[37] In the United States, in 2000 Congress passed the Children's Internet Protection Act that threatened public libraries and schools with a withdrawal of federal funding if they did not agree to install Internet blocking software.[38] Mattel, the company that produces the web filtering software called Cyber Patrol, sought to ban others from publishing criticism of its list of banned sites used in its software by placing sites critical of the company on the list of sites banned by Cyber Patrol![39] This is a pernicious use of corporate power over one's own product to prevent criticism. Such attempts at restrictions are at a qualitatively different level than those in Third World countries. They suggest that, as the Internet matures, there is a greater sophistication in banning issues and techniques.

Challenge and Protest of Digital Power

There have been five types of dissent or protests in and around the Internet. One has been coming from outside the Internet ("Smash the Internet"); the other four have been boring from within the Internet. For want of better words, the latter four can be summarized as: Organizing and Protesting Digitally; Software Piracy; the Open Source Movement; and Hackerdom.

"Smash the Internet"

This movement has been based in protests about globalization, which is seen as wiping out indigenous and autonomous local cultures, governments, and communities. Many see the Internet as an instrument of globalization. It allows corporations to extend their reach globally. The stock markets are able to trade globally and to move billions of dollars in currencies in a matter of seconds, often destabilizing countries and their governments, especially in the underdeveloped South. The protests at Seattle, Quebec City, Milan and Kananaskis typify this type of theme.

Organizing Digitally

Closely related to "Smash the Internet" are those who would use the Internet to organize political protests. Many of the causes are the same, but the methods are somewhat different. Rather than rejecting the Internet as necessarily evil, these groups see value in using the Internet as a tool to communicate with sympathizers in other countries, and bring pressure to bear on their corporate and government opponents. International strike solidarity websites are a typical example of this kind of protest. A second example are the protests over child labour and sweatshops operating in third world countries, but controlled by and selling their products into the developed western and Northern capitalist economies. The anti-Nike movement is typical of such protests. Even the peasant Zapatistas made full use of cyberspace to gain international support for its struggle against Mexican authorities. This topic is too vast to go into in the context of this paper.

Software Piracy

Those excluded wholly or partially from the benefits and opportunities of the information and communication technology revolution have found ways to benefit from the revolution without playing by the rules of the "digital game". One has been not to honour the code of intellectual capital or private property. Microsoft has been quite proprietary in guarding its software code. One response to this has been to engage in software piracy. Software

piracy is defined as the difference between software applications that are installed and software applications that are legally shipped. The piracy rate is the "volume of software pirated as a percent of total software installed" (BSA, 2001: 9). It has been estimated that the worldwide market value of pirated software in the year 2000 was $11.75 billion. The highest rates are in the "digital have-not" countries (see Table 25). Software piracy rates vary between 50% and 70% in Eastern Europe (the highest rate), the Middle East, Africa, Latin America, and Asia. The lowest rate (24%) is in the United States; the second lowest rate (36%) is in Western Europe. The Chinese market has one of the highest rates of software piracy. It has received a lot of media attention, perhaps due to its potentially huge size and lost revenue.[40] It is interesting to speculate that the extremely high rates of software piracy among the "digital have-not" countries is a combination of the desire to join the digital revolution, the lack of economic resources to pay for the software and Internet applications, the lack of strict controls protecting the private property of foreign companies, and resentment by their governments, organizations, and citizens over domination of the Internet by the United States and the Western powers. Curiously, software piracy is one way of putting a ladder up between the "digital have-not" countries and the "digital have" countries, but not in a way that is seen as legitimate by the digital have countries. This is why software piracy is a good example of a political-economic revolt by the digital have-nots.

Table 25: Top 25 Countries by Piracy Rate, 1999 and 2000

Country	1999	2000
Vietnam	98%	97%
China	91%	94%
Indonesia	85%	89%
Ukraine	90%	89%
Russia	89%	88%
Lebanon	88%	83%
Pakistan	83%	83%
Bolivia	85%	81%
Quatar	80%	81%
Bahrain	82%	80%
Kuwait	81%	80%
Thailand	81%	79%
Thailand	83%	79%
El Salvador	80%	78%
Nicaragua	88%	78%
Oman	80%	78%
Bulgaria	81%	78%
Romania	80%	77%
Guatamala	80%	77%
Paraguay	83%	76%
Jordan	75%	71%
Honduras	75%	68%
Costa Rica	71%	68%
Dominican Republic	72%	68%
Kenya	67%	67%
Nigeria	68%	67%

Source: Adapted from BSA (2001:4)

Open Source Movement

The other challenge to the privatization of the Internet and to private corporate intellectual capital has been to adopt a philosophy and practice opposite to the proprietary approach practiced by the large dot.com companies such as IBM, Microsoft, Dell Computers, etc. This is called the "open source movement." The open source movement is posited on the idea of a global collective working voluntarily and without financial compensation in developing software code. Teams and individual computer programmers around the world work collectively in improving the source code for software programs. Is the open source movement the lower or disposed digital class? Are those who advocate corporate proprietary rights in software, and the lack of open sharing on the Net, the upper digital class? A good representative example of the open source movement is Linus Torvalds, the Finish computer science student, who invented the operating system, Linux, and freely distributed its source code on the Internet for other programmers to further develop. Linux has now come to occupy 25% of the global server operating systems market, and is somewhat of a rival to Microsoft's Windows NT, 2000, and XP. Torvalds has been depicted as a revolutionary. The *New York Times Magazine* compares him to radical Tom Hayden.[41] Eric Raymond (2001) has been writing on the Net (in true open source movement style) an evolving open source movement manifesto called *The Cathedral and the Bizarre*. "*FEED*'s Steven Johnson compares this manifesto to the Port Huron Statement, Tom Hayden's white paper for 1960s student radicalism." Torvalds has come to symbolize the lower half of the upper layer of the digital divide. Is the open source movement a skilled underside of the digital divide? Computer programmers who worked freely are highly skilled and experienced, but they have a different perspective on propriety rights and the ideological and political significance of "community," whether virtual or real, than Microsoft and Bill Gates. The latter represent the upper side of the digital divide. They have it all – the knowledge, the skills, the experience, plus the organization and the wealth to assemble a talented scientific and technical organization (not a community) to develop commercial projects, such as Windows 95, Windows 98, Windows NT, Windows 2000, and Windows XP. What they lack is the vision of an open source community. There is a convergence between the sociology of communal struggles and the open source movement, and between upper class property and a defense of privilege. What the uppers lack is the openness to innovation. It can draw on the global community but only by paying it handsomely. It has to protect its property right, and in doing so it slows down innovation, and winds up marketing a poorer product. Windows is infamous for its bugs, crashes, and freezes, in contrast to the stability of Linux. Yet that does not matter. As long as Microsoft has a captive global market, it can build a capitalist empire on defective software code. This reveals the inner workings of the digital classes and their relationships with the digital and non-digitized poor, which bear a remarkable resemblance and continuity with historical class struggles.

Hackerdom

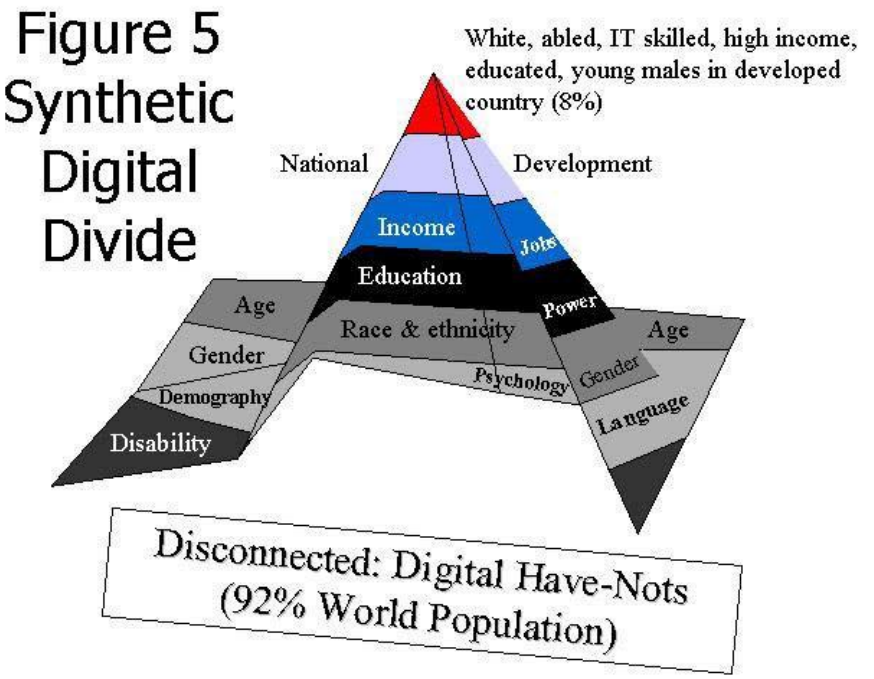
The media have popularized and stereotyped the "hacker" as disenchanted young male criminals who gain unauthorized access to computer systems for the purpose of obtaining confidential information and destroying the system in whole or in part. This definition is rejected by the hacker community, which focuses on the more positive aspects of hacking or "cracking." A hacker is:

> 1. A person who enjoys exploring the details of programmable systems and how to stretch their capabilities, as opposed to most users, who prefer to learn only the minimum necessary. 2. One who programs enthusiastically (even obsessively) or who enjoys programming rather than just theorizing about programming. 3. A person capable of appreciating hack value. 4. A person who is good at programming quickly. 5. An expert at a particular program, or one who frequently does work using it or on it; as in `a UNIX hacker'. (Definitions 1 through 5 are correlated, and people who fit them congregate.) 6. An expert or enthusiast of any kind. One might be an astronomy hacker, for example. 7. One who enjoys the intellectual challenge of creatively overcoming or circumventing limitations. 8. [deprecated] A malicious meddler who tries to discover sensitive information by poking around. Hence `password hacker', `network hacker'." (Faase, nd)

There are parallels between the open source movement discussed above, and hacking. Neither the hacker nor the open source movement is a dot.com instant millionaire. They both rely on a sense of community. Both rely on a high standard of technical skill. Both are good problem-solvers. Both are intrigued by challenges. The hacker rises to the challenge of a problem to be solved. She or he derives enhanced status within a select community for being the first to have solved a difficult problem (Jordan and Taylor, 1998). But some who engage in hacking do cross the border into criminality. Some do invade firewalls and passwords to gain access to the administrative areas of other Internet servers. And some do leave a trail of damage and destruction in the systems hacked (Loper, 2001; Thomas, 1998). The open source movement does not have this reputation, whether deserved or not. There is also a fine line between hacking and acting as a security programmer in order to prevent others from hacking into systems. Given their abilities, some former hackers have been hired by hi-tech security companies. One of their first jobs sometimes is showing their new employers how they hacked their systems in order to plug such holes. Hackers are thus "digital haves," but from a position outside the system. Their computer skills make them digital-haves; their ideological perspective on the Internet and dot.com companies place them apart from mainstream digital haves."

Towards a Synthesis?

How might we think about the ladders, ramps, cloverleaves, and bridges connecting the various dimensions of the digital divide? I have attempted to represent a possible synthesis as a three-dimensional space in Figure 5. The diagram represents the multi-dimensional digital-haves divided against the digital have-nots. The upper part of the diagram represents 8% of the world's population. The bottom half are the heterogeneous digital have-nots. They constitute 92% of the global population.



The image in Figure 5 is divided into the main dimensions of the digital divide. Each dimension has both independent and overlapping effects on computer and Internet usage. At the "peak" or the "upper part" of the digital haves there are several socio-economic characteristics that converge to intensify computer and Internet usage. These are the "white, abled, IT skilled, high-income, educated, young males in developed countries." There are very few in this category that are not heavy computer and Internet users. The rest of the image is sectored into the main dimensions of the digital divide outlined throughout this paper: national development or geographic and infrastructure differences between countries and regions; income; education; race and ethnicity; age; gender; and disability. Although research on the independent effects of these dimensions is in its infancy, there is some evidence that income and economic factors are the primary determining conditions for the digital divide. For example, in a sophisticated multivariate statistical analysis of Internet penetration in Canada, the Public Interest Advocacy group conclude that age, education, and gender have little effect on Internet penetration compared to income differences. "Income creates the greatest divide in Canada for access to the Information Highway. Cost barriers to Internet access are multidimensional: they need to be considered in a wider context than only the cost of online services… In addition to the obvious costs of computer hardware or set- top boxes, there are also the costs of software, and monthly Internet service provider (ISP) charges. These costs present immediate barriers or obstacles for many non-users" (Reddick, Boucher, and Groseilliers, 2000: 49). When this is considered in the international context where these costs are much higher relative to the standard and cost of living, it may be speculated that economic factors loom even larger as determining factors of the digital divide in many underdeveloped and developing countries.

What are the principles, hypotheses, or laws of the digital divide? They can be summarized in a short list:

1. Globalization and International Development and Underdevelopment: There are very sharp international distinctions and layers between the digital haves and digital have-nots. Generally, the developed North and West has much better Internet access than the developing and underdeveloped South. Nevertheless there are some exceptions in which formerly underdeveloped countries have been making strides in economic and national development, and are witnessing rapid increases in Internet infrastructure and access. The four critical factors explaining the global digital divide are technology infrastructure, government policies, culture, and international disparities in wealth and income.

2. Income, wealth and poverty: Internet access will increase with a rise in income, whether based on individuals, households or other organizations, or measured by individual earnings, household income, or gross national domestic product; conversely, a drop in income and wealth, and increases in poverty and unemployment, will exclude individuals, households, other organizations and countries from the Internet. Income will also weaken other factors, especially gender and education.

3. Education: A rise in formal education and literacy will result in increased computer ownership and Internet access, depending on the wealth of individuals and organizations. Educational institutions in wealthy neighbourhoods will have better Internet access than schools, colleges, and universities in poor neighbourhoods or regions of the world. Government and education policy to connect schools and other education organizations will increase computer and Internet usage, depending on internal organizational factors, such as teacher training and curriculum reconfiguration to take advantage of distance education opportunities.

4. Occupational Stratification: There is an occupational information technology skills digital divide. The digital haves consist of three heterogeneous layers. First, the core of the digital haves is the highly skilled computer programmer, network analyst, web designer, multimedia technician, hardware specialist, java scriptwriter, etc. Second, there are professionals and managers who are heavy users of the Internet for communications from stationary computer desktops and mobile pagers, cell phones that surf the web and access the stock markets, personal data assistants (PDAs), and palm pilots that keep track of one's appointments and addresses. There is also a third layer of digital haves who perform more menial tasks: stereotypically, these are women clerical workers who do word-processing and enter figures into spreadsheets. This third layer, lacking the economic resources or the workplace authority to affect how technologies are use, melts into the digital have-nots. These are the semi-skilled and unskilled workers who do not have work-related access to computers. Interestingly, however, many of the digital have-nots are exposed to, and affected, by workplace computer technologies. As travelers by bus, auto, train, or airplane, the computer chip is an invisible substratum of trip planning.

5. Labour: Technology occupies a central location in the relations of production and in the labour process. It is a means of controlling the labour process through managerial reorganization of workplace knowledge and skills. It has become a flash point in industrial relations disputes and informal struggles on the plant floor and in offices. Somewhat in response to the relative cost of labour in advanced capitalist countries,

technology becomes globally reconfigured in the international division of labour, as corporate head offices in the developed North direct the production of computer components with comparatively cheap labour in the underdeveloped South. The digital divide is transformed from two dichotomous and juxtaposed categories to a contradictory class and social relationship internally within the workplace, and externally within the global division of labour.

6. Age: As age increases from childhood to mid-age, there has been an increase in computer and Internet usage, after which there is a dramatic decline, especially among seniors. More recently, young persons have had very high rates of Internet access, especially because of school connectivity programs. There is now more of a steady negative linear relation between age and Internet usage: as age increases, Internet usage decreases. However, seniors are one of the fastest growing sectors of Internet users. This growth does not change very much the Internet-age profile since seniors have a long way to go in order to catch up to the same level of Internet usage as the rest of the population. When present age is held constant, Internet usage increases the earlier one began using a computer. This probably reflects experience and self-confidence in computer and Internet usage. However, age has a much weaker effect on Internet access once income is taken into account.

7. Race, Ethnicity and Language: Members of visible and ethnic minorities, regardless of country, tend to have less access to the Internet. This is partly based on poor economic resources, discrimination, cultural preferences, and linguistic barriers. However, some categories of immigrants have high education and high income, or at least are highly motivated to improve their career opportunities by moving internationally and vertically. Such immigrants are likely to have a high degree of computer ownership and Internet access. One example is Asian Americans living in the United States.

8. Psychology: There is a psychological digital divide. The digital haves are self-confident, effective, and efficient in their use of computer and Internet technologies; the digital have-nots lack such confidence, often suffering from mild to severe computer anxieties, even to the extent of undergoing negative physical transformations when confronted by a computer monitor, keyboard, and CPU. Computerphobia is correlated with such socio-demographic and economic factors as age, income, education, and race, though some of these associations may be spurious, and may be rooted in the lack of computer and Internet experience. Nevertheless, there is a segment of the population that suffers from computer anxiety, regardless of their socio-demographic characteristics. This is the pure form of a psychological digital divide.

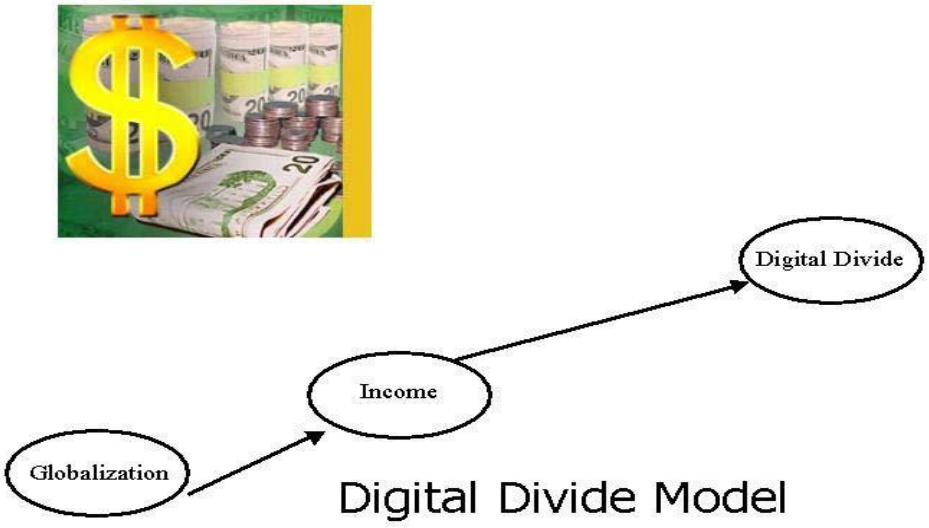
9. Disabilities: Disabled persons are part of the digital have-nots. Many are unable to cope physically, mentally and emotionally with complex computer technologies, especially when web designers do not take measures to accommodate their needs (such as using alt text tags for images). The impact of disability on the digital divide appears relatively independent of income, education, gender, race and ethnicity, and age. However, there is another side to this picture. Many advances have been made in adaptive computer technologies to accommodate hearing, seeing, and other physical impairments. Where disabled persons have access to such technologies, such as through government assistance programs, a new world opens up to this segment of the population, and it becomes avid computer and Internet users. Because of the expense of such computer technologies, and

the generally poor economic resources of the disabled, there are only a small proportion of severely disabled persons who have this type of access to computer and Internet technologies.

10. Power and Politics: The Internet is a dynamic and contested terrain. Digital rulers will manipulate computer and Internet technologies to maintain, enhance, and defend their power base inside cyberspace, and outside in other societal institutions, especially economic and political. The digitally ruled will employ non-digital and digital tactics to contest the present configuration of digital power, as well as the ways in which the Internet supports other entrenched power hierarchies in society. Ironically, some of these digital struggles critique the same digital structures that are simultaneously used as political tools to advance the interests of the digital have-nots.

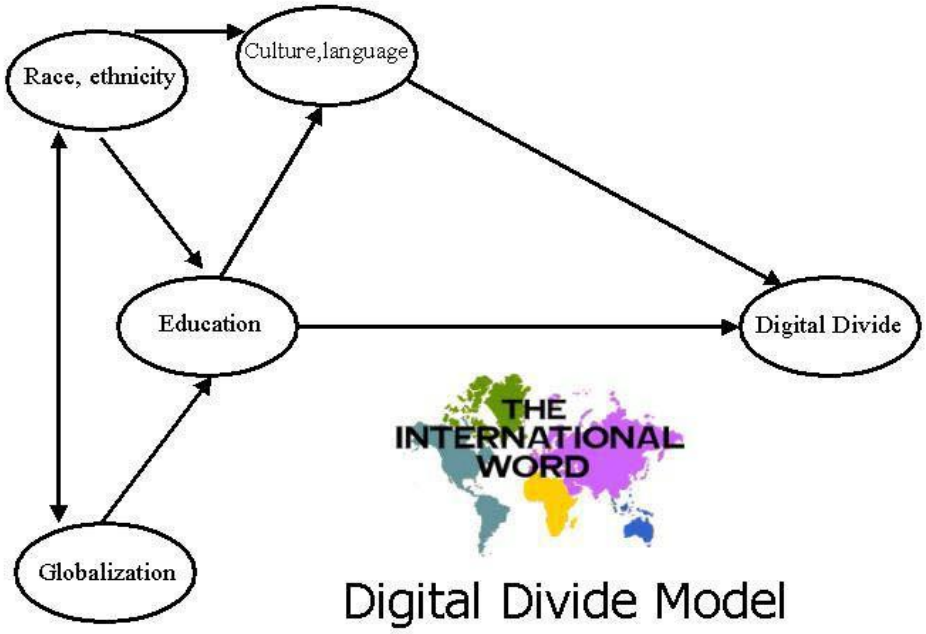
I will now turn to a discussion of selective areas of the synthetic model of the digital divide. If the major determination of the digital divide is income and wealth, it should be set within a global context. National differences in wealth and economic development set the context for national differences in infrastructure, which enable or prevent Internet access, especially at high speeds, and the context within each country where individuals of differing income levels are able or not able to access the Internet (see Figure 6).

Figure 6: Income and Globalization



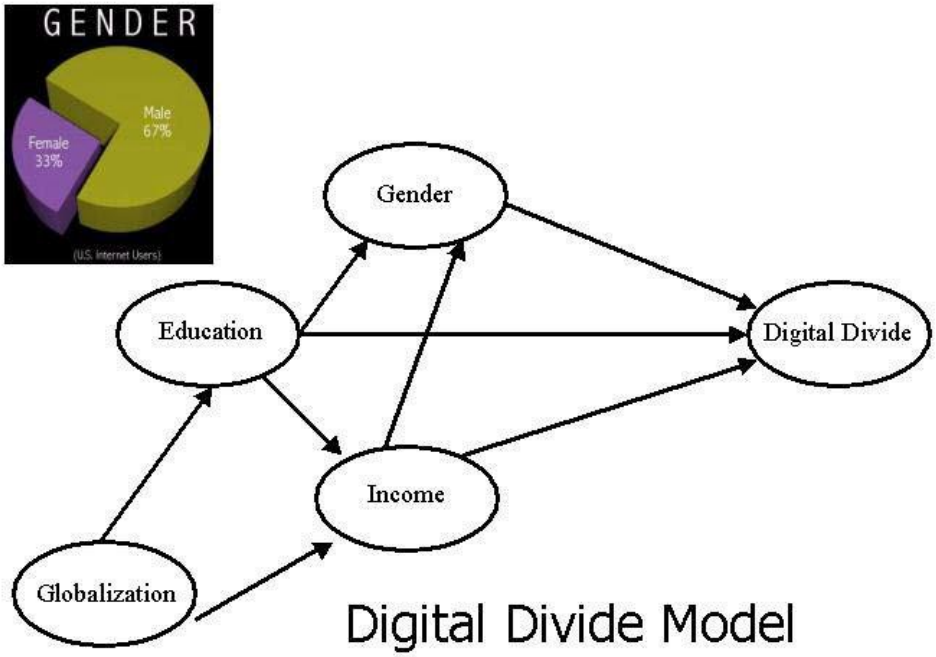
The influence of culture, language and race and ethnicity is also part of this general model. They relate most directly to national differences in cultural expressions, languages, and the race and ethnic composition of nations. Cultural differences and language enable ease of Internet use if one operates in the English language and is a Caucasian from the developed North (see Figure 7). Language and culture emerge directly from ethnic and racial differences between nations and countries. They are also heavily influenced by education, which has a way of breaking down traditional cultural opposition to the style of open expression common on the Internet. Advanced education in many countries usually exposes students to the English language, the most widely written and used language on the Internet, though declining in influence. In Figure 7, I drew an arrow from globalization to education, and to race and ethnicity. This symbolizes the internationalization of education, especially distance education, and the role of ethnic and racial tensions in the international global arena.

Figure 7: Culture, Language, Race and Ethnicity in the Digital Divide



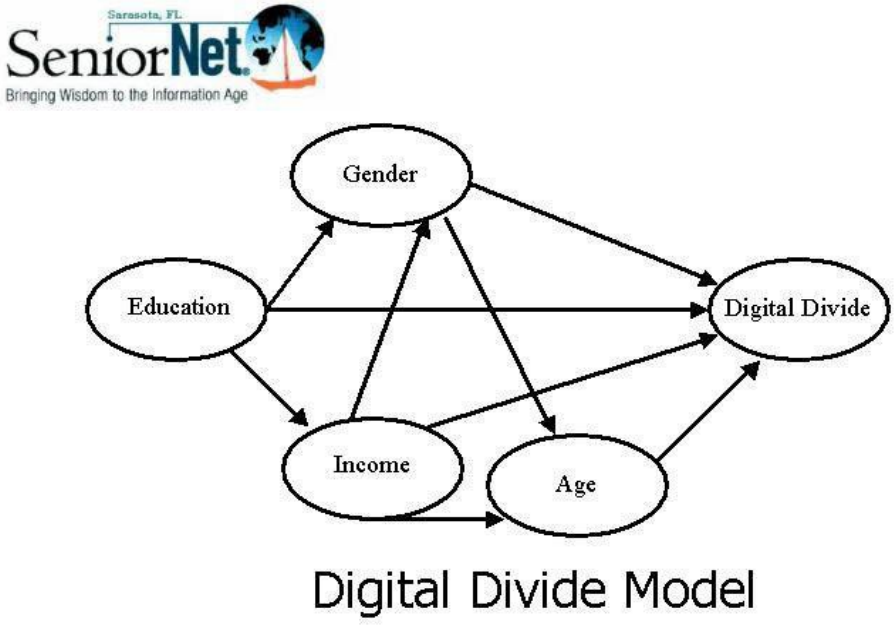
Gender also places a role, albeit secondary, in Internet access and usage (see Figure 8). Males are generally more likely to own computers and to have greater Internet access than women. But this is not the case in all countries, as we observed earlier. Gender differences are very small in North America and some of the Scandinavian countries, but are quite pronounced in other countries, such as Saudi Arabia, Germany, and France. Hence, we have to consider the global context when considering gender. The global influence on the digital divide likely operates at a national level through education and income inequality. In those countries where women have little access to advanced education, they are likely to have much lower incomes than men, and hence not have the financial wherewithal to afford computer technology and Internet access charges. I have thus drawn an arrow in Figure 8 from globalization to the digital divide through gender by way of income and education.

Figure 8: Gender in the Digital Divide



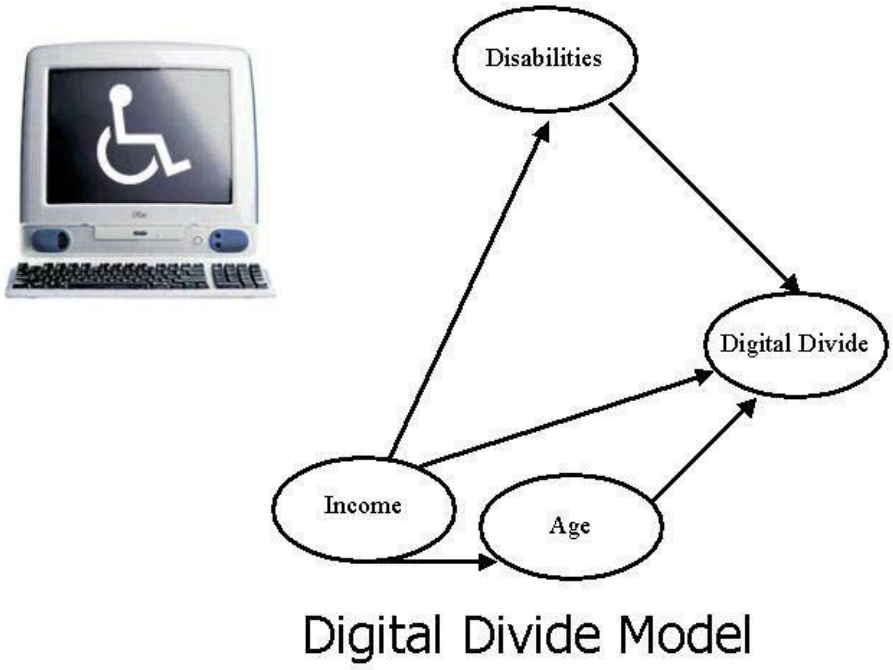
We remarked earlier that while there are pronounced differences in computer ownership and Internet usage by age, these differences to a great extent are influenced by other factors, especially by income, wealth and poverty (see Figure 9). There are marked differences in age by income. Income rises from youth to the height of one's career between 45 and 60, after which it declines sharply. It should come as no surprise that this has been the contour of the Internet age profile. Both income and Internet access rise together with advancing age, and then decline together after the late 50s. However, as noted above, more recently the highest Internet access is found among the very young. This is likely caused by two factors: government programs connecting most schools to the Internet; and, parents, worried about the future of their children in a knowledge-based economy, purchasing home computers and paying for high-speed Internet access. Hence, it should come as no surprise that two countries as different as Korea and Canada now have exactly the same age Internet profile: a steady, linear, and negative relation between age and Internet access. Age has a diminishing effect on Internet access when we control by income. Income also interacts with gender in how age affects Internet penetration. Older men are more likely to have higher income levels and to have higher Internet access than older women, who have lower incomes and lower Internet access. Education in Figure 9 provides the backdrop for the role of age. Older persons did not have the same educational opportunities that young persons do today. Literacy in the manipulation of information, as well as technical skills, plays a strong role in the digital divide (Reddick, Boucher, Grossielliers, 2000).

Figure 9: Age in the Digital Divide



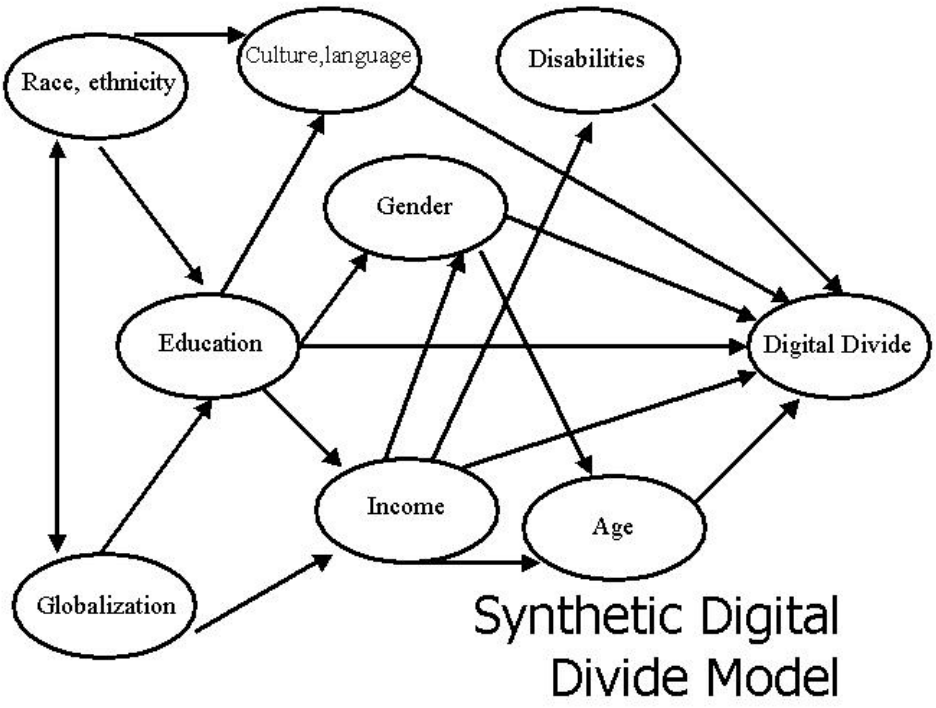
In Figure 10, I depict the role of disability in the digital divide. Although this affects only a small proportion of the population, disabilities have two dramatically opposite roles in computer technologies: either they pose a formidable barrier to communication with others, or they become a prized access in opening up a new vista of communications with others through the use of adaptive technologies. Which avenue is followed depends to a great extent on the role of income and age shown in Figure 10. Disabled persons who are fortunate enough to have a comfortable material living standard (through family membership, or government programs) likely can avail themselves of the advances made in screen readers, etc. to make effective use of the computer and Internet. But the majority of disabled persons are not so fortunate; income differences, and relative, if not absolute, poverty exclude them from making full use of networked computer technologies. This has consequences on age. Elderly persons are more likely to suffer from a host of physical disabilities, which further exclude them from utilizing computer technologies and gaining Internet access.

Figure 10: Disability in the Digital Divide



In Figure 11, I attempt to synthesize these partial relationships into an overall explanatory model of the digital divide. The caveat is that this is a new and uncharted area of research. These relationships are therefore speculative. But they are based on existing empirical evidence, to the extent they exist and are accessible. The main conclusion I would draw is that the digital divide is primarily explained by income differences based in globalization, and secondarily by education, gender, age, race and ethnicity, and differences in disabilities. This model heavily rests on socio-economic differences. They do not explain all of the digital divide. The rest of the explanation lies in social psychological and political factors, topics which we only briefly introduced, and do not have the space to pursue more fully here.

Figure 11: A Synthetic Model of the Digital Divide



Pitirim Sorokin

What does Pitirim Sorokin have to do with the Internet and the digital divide? A quick answer is, "nothing." Sorokin lived before the dawn of the Internet. Born in 1889 in Russia, he died in 1968 in the United States. After a tumultuous relation with both the Czarist and Bolshevik governments which jailed him three times and sentenced him to death. He was banished from the Soviet Union and immigrated to the United States in 1923. He served as Professor of Sociology at the University of Minnesota between 1924 and 1930 and at Harvard University between 1930 and 1955 (Johnson, 1995). When he died in 1968, the seed of the Internet had already taken root. In response to Russia's launch of Sputnik in 1957, the United States Department of Defence established ARPA, the Advanced Research Projects Agency, in 1958. Its goal was to ensure that adversaries would never develop military superiority over the United States in the area of technology, especially in computing and communications technology. In cooperation with academic researchers, ARPA worked on a plan to network computers so that an attack on one server and one part of the network would not knock out other servers or the rest of the network. This remains a fundamental principal of the Internet to this day, and is one reason why it is so difficult for national governments to regulate it or to censor its content. Of course, Sorokin did not live to witness the full flowing of the Internet, which is still in its infancy, despite its popularity and its increasingly household status. Nevertheless, it can be argued that Sorokin's sociological theories, writings, and analyses have relevance to our understanding of the Internet in general and the digital divide in particular, especially from a sociological viewpoint. If he were alive today, he would be writing about the digital divide since it fits so well six of his preoccupations.

1. <u>System, Laws and Synthesis</u>

Sorokin (1985) was a system builder. He was not content to let facts lie in a fragmentary state of disarray. He built socio-cultural systems and classifications linked to one another by law-like propositions that integrated disparate facts under a worldview of civilization and history. If he had to confront the Internet, he would probably stand back and integrate it into more abstract systems of culture, knowledge, communication, and historical phases of transitions and fluctuations. He would certainly not be satisfied with the synthesis that I have suggested in this paper. He would merely use that as a starting point, and extend it into more general systems of organizations, institutions, and groups in society.

2. <u>Historical Change, Fluctuations, and Circulation</u>

Sorokin (1946; 1957) sketched broad sweeps of historical change in terms of socio-cultural systems. He thought that history passed through three major cultural systems. An *ideational* cultural system, dominant in the Middle Ages, was based on the principle of a "supersensory and superrational God as the only true reality and value." This system started to decline in the 12th century, to be replaced by an *idealistic* system in the 13th and 14th centuries. Its major premise was that "true reality is partly supersensory and partly sensory." It integrates into one unity the supersensory and superrational with the rational and sensory. A third cultural system, the *sensate*, started to emerge in the 16th century. Sorokin characterized it as a "sensory, empirical, secular, and 'this-worldly' culture." Over time, it permeated all institutions and components of society, such as the military, economic, political, familial, legal, and religious. It reigned supreme until the middle of

the 20th century. In the context of the crisis of the Second World War, Sorokin suggested rather strongly that the sensate cultural system was starting to decline, to be replaced by as yet an unknown system.

How would he apply these cultural systems to the Internet? I can speculate on two possibilities. First, Sorokin may have viewed the Internet as either a pure sensate system or an idealistic one, depending on its assessment in terms of a balance between the sensory and supersensory. He would in all likelihood have been appalled at the crass commercialism and hedonism of the Internet, characterizing it as pure sensate culture. However, he may also have been struck by the much greater freedom of expression and access to archives of information and knowledge at a level unprecedented in history. When this is considered in the context of a strong religious presence on the Internet, all the way from the Papacy to Judaism to Taoism and the religious right, he may have tempered his sensate judgment of the Internet, and seen cyberspace more as an idealistic cultural system, blending the sensate with the supersensory. Second, Sorokin portrayed the Sensate as in decline, even during the 1940s. Rather than going back in history and revisiting an earlier cultural system (the idealistic), he may have struck out on a bold prediction of a major turning point in history with the dawn of the Internet. For want of a better term, he may have characterized it as a Cyberspatial Virtual Cultural System that is extra-sensory, extra-rational, and "out-of-body". Certainly much of the literature on virtual culture is about this new cyborg extra-bodily realm.

3. Physical and Social Space

Sorokin's (1959) conception of physical and social space can easily be applied to an understanding of cyberspace and the Internet. This exists at two levels. At one level, it is about how the Internet is diffused across the physical space of the globe and the social space of its nations, organizations, households, and groups. Secondly, Sorokin wrote about the complexities of circulation that sound very much like the way in which data packets move across the Internet. He asked whether, in the process of circulation, cultural elements "break into pieces" or "consolidate with one another in the process of drifting. Do they clash and destroy this or that 'floating' section?" (Sorokin, 1959:553). Earlier in this paper, I referred to TCP/IP protocols governing the way data packets are transmitted from sender to receiver. In the process of circulation, they are broken up into smaller parts and recombined at the point of destination. Sometimes they do not successfully recombine, and clash with other data packets making their way through the pipelines of the Internet. These are in essence Sorokin's cultural bits and bytes that seek one another in the process of diffusion in social and physical space.

4. Diffusion and Communications

Sorokin (1959: 549-640) wrote also about the diffusion of cultural objects along transportation and communications lines across physical and social space. He saw this as a two-way vertical and horizontal diffusion. Cultural objects flowed from the upper classes to the lower classes, and from the city and to the countryside. But he also depicted a reverse flow of a more primitive set of cultural objects from the countryside to the city, and from the lower to the upper classes. The applicability of these ideas to the Internet and digital divide is obvious. The origin of the Internet lay in the academic upper-middle

classes in the United States, and its military-industrial complex. From there lines of communication fanned out across the world into less developed countries. Diffusion was not random or even, but was constrained by the laws of communication and socio-cultural systems.

5. Economic, Occupational, and Political Stratification

Social stratification and mobility were one of Sorokin's specialized areas of research. In fact, he predated both the field of social mobility and the functional theory of social stratification later popularized by Talcott Parsons, Kingsley Davis, and Wilbert Moore. His preoccupation with this topic bears a strong resemblance to the concern of this paper with the digital divide. He defined *social stratification* as "the differentiation of a given population into hierarchically superimposed social classes" (Sorokin, 1959: 11). He wrote about three major forms of stratification. *Economic stratification* is based in economic inequality: "differences of income, economic standards, and…the existence of the rich and poor stratra." *Occupational stratification* is based on unequal occupational status and honour and workplace authority between bosses and those "who are subordinated to bosses." *Political stratification* is the hierarchical distribution of individuals by authority and prestige, producing the strata of rulers and the ruled. All three forms of stratification have been considered in this paper in terms of the digital divide. Sorokin was additionally interested in international variations in stratification, the relationships among economic, occupational, and political stratification, and the mobility or "circulation" of individuals between hierarchically defined strata. I have considered all three of these themes in this paper. The ladders considered in this paper are an instance of Sorokin's vertical circulation between strata; the ramps, bridges, and cloverleaves are an instance of his consideration of the relations among economic, occupational, and political stratification. There seems little question that, were Sorokin alive today, he would be writing seriously about the digital divide in a global context.

6. Intellectual Property

In *Fads and Foibles* (1956), Sorokin was concerned, among other things, with ignorance, knowledge, intellectual history, and plagiarism. He accused some of his sociology colleagues of intellectual dishonesty. He felt that many sociologists had developed the habit of claiming credit for new ideas when, in fact, if they had they read the classics they would have realized that many of their ideas had been previously developed and thought about by others. He had also accused other sociologists, including Talcott Parsons with whom he had a rocky relationship, of plagiarism, of stealing his ideas, and not giving him proper credit. We must remember Sorokin was writing in a pre-paperless era when there was no substantial Internet. He died at the dawn of the modern Internet and web. If he were alive today, he would be expressing grave concerns about intellectual property on the Internet. He would be worried about the ease with which faculty and students alike can lift digital files, images, and ideas from web sites, e-mail messages, listserves, and newsgroups, copying and pasting them into their own work, while removing traces of their origin. Intellectual property and fair use are hot topics on the Internet today. I think Sorokin would be part of this discussion and debate. He might even theorize that it is a way for the "digital have-nots" to get access to the property of the "digital haves" and wonder about the criminality of it all.

Conclusions

What are the most relevant questions to ask about the digital divide? What are the most realistic answers or solutions to these questions? There are arguably five important questions.

a. How big is the digital divide? What is the comparative size of the "digital haves" and "have-nots"?
b. What are the variations in the manifestations of the digital divide? Is it the same everywhere, or are there systematic differences globally, nationally, regionally, or locally?
c. What are the main conditions, reasons, or causes of the digital divide? Is there any prospect that these will mitigate or weaken?
d. How important is the digital divide to the quality of daily life, to personal health and wellbeing, to the social fabric of the global and local community, to the viability of governments, and to economic growth?
e. What is the future trajectory of the digital divide? Will it become deeper, remain about the same, or decline in severity?

Some government, academic, and private survey statistics suggest a recent decline in the digital divide, or a narrowing of the gap between the digital haves and have-nots. It has been suggested that the growth rate of the digital haves has slowed down, while the growth rate of the digital have-nots has accelerated to such an extent that the divide is starting to disappear, and the Internet is become more international, less American, and less English dominated. For example, Dr. Noah Elkin, senior analyst with eMarketeer.com, an international Internet research agency, states:

> Once the domain of young, educated, wealthy early adopters, Internet users now include more women, minorities, elderly and working-class people. And while Americans still dominate the Internet, the complexion, language, and culture of the web is becoming more heterogeneous and international every year. Many of the newest users, for example, are from Latin America, Africa, Europe, and Asia" (Elkin, 2001).

The United States and Canada are losing their dominance as other countries, especially in Asia, increase the proportion of their citizens who are online. With this comes a cultural and linguistic change; the Internet becomes less Anglo-Saxon, and more racially, linguistically, and culturally diverse (e.g., Featherly, 2001). International information and communication technology companies once dreamed of dominating the mainland China market. However, with help from the Chinese government, a new Chinese technology company, *Legend,* has emerged. Not only is it manufacturing PCs for the Chinese market; it is moving into software development and hand-held devices. It has a vast internal distribution network and cheaper costs with which foreign companies cannot compete.[42] This gives such digital have-not countries a relatively autonomous base from which to leap frog into digital haves, though a complete transition is some way off into the future and may never be possible because of grinding poverty in many Third World countries.

There is even some evidence in the United States and Canada that, in the case of gender, the divide has reversed somewhat, with women being more wired than men. This recent phenomenon is based on an exponential acceleration in the absolute and relative numbers of people who are purchasing computers and gaining access to the Internet from home, from school, and from work. In recognition of this fact, the U.S. National Telecommunications and Information Administration called its fourth *Falling Through the Net Report* by the title *Toward Digital Inclusion,* after calling its first three reports *The Digital Divide.* Its 2000 report stated:

> Virtually every group has participated in the sharp upward trend of Americans connecting their homes to the Internet. Large gains occurred at every income category, at all education levels, among all racial groups, in both rural and urban America, and in every family type… This year … households in the middle income and education ranges are gaining ground in connecting to the Internet at a rate as fast or faster than those at the top ranges. [This] suggests that, in some cases, the digital divide has begun to narrow or will do so soon, and that we are entering a period of fuller *digital inclusion.* In general, groups with very low adoption levels in 1998 experienced some of the highest expansion or growth rates over the last two years…" (NTIA, 2000: 1-2).

The NTIA suggests that the rural areas of the Unites States now have Internet access rates that rival national averages. "Rural areas narrowed the divide when compared to the national average… The gap between households in rural areas and households nationwide that access the Internet has recently narrowed. There was a 4.0 percentage point difference in 1998, narrowing to a 2.6 point difference in 2000… As a result, the Internet access rates for rural households now approximate those of households across the country… In contrast to the strong growth in rural areas, households in central cities have experienced much lower rates of increase for their Internet penetration… Central cities have slipped below the rural areas in terms of household access" (NTIA, 2000: 4-6). However, urban areas continue their higher-than-average Internet access for every income, education, and racial category. The geography of place thus continues to have a strong influence on Internet access, regardless of the rhetoric of access regardless of place (or time).

Why might the digital divide be closing?

1. Greater awareness of computers and the Internet.
2. Greater affordability of computer technology as the price drops for a given unit of ram and microprocessor speed. Entire treatises have been written on this topic.
3. Technology becomes adapted to a wider market; more goods are being offered for sale across the Internet. More databases and other information become freely available on the Internet.
4. Greater usefulness of the Internet to satisfy people's needs. For example, the huge growth and popularity in health and medical sites that offer supplementary or alternative advice to the family doctor.
5. Greater ease in using the technology, especially with "Plug n' Play".
6. Greater diffusion of computer and Internet skills, especially among the young.
7. Greater number of access points, including home, work, school, library, etc.
8. Greater integration of the Internet into daily work and leisure activities.

However, we must remember that only 8% of the world's population is connected to the Internet. It is safe to assume that a somewhat larger percentage is either aware of the existence of something called "The Internet" or wishes to be connected, but cannot do so for a variety of reasons. But it is also safe to assume that a much larger number, and perhaps the majority of the world, has no desire to become connected, remains indifferent, or is completely ignorant of anything called the Internet. IPSO-Reid has estimated that 25% of the urban population of Russia, China, India, and the rest of the developing world has not even heard of the Internet. There are vast reaches of undeveloped countries where fighting off starvation or land mines is a more urgent priority of life and death than getting connected to the Internet in order to surf for information, and purchase goods from the developed West. Two opposite examples might suffice.

- Geoghegan (1994), in his famous diffusion model of instructional technologies among higher education professors, estimates that at least 10% of college and university faculty have no interest in using information and communication technologies. This has been supported by a number of surveys, some of which suggest that this figure is much higher.

- Many construction workers in Africa eke out a meager existence by being hired out as temporary labourers for the day (Wresch, 1996). Living in peasant huts, and carrying on a pre-industrial agricultural existence, it is hard to imagine that such populations would either know about the Internet or have any interest or capability in surfing the Net to purchase goods in a money economy, regardless of a plastic credit card economy. The recent events in Afghanistan remind us once again that many war-torn areas of the world are more consumed with fighting off starvation and bombs than logging into cyberspace.

My own assessment is that the digital divide runs deep and has little prospect of disappearing in the near or even distant future. Currently, as noted earlier, about 92% of the world's population is excluded from participating in the Internet. We tend to hype the Internet, especially in the West and North, and assume that almost everyone is connected. I have two daughters in school. Among their friends, it is assumed that everyone has an e-mail address. They send messages to one another and chat with one another in real time as if nothing could be more normal or "second nature.". They are the *children of the Internet*. They never lived in a world where there were not desktop computers, laptops, or notebooks connected mysteriously to other computers in other homes, other provinces, and other countries. Homework is not going to the library and checking out books. It is sitting in front of the computer monitor and having the books come to you through database probes and web searches. Some of our children may not understand much about the underlying technology. But they do know, or think they know, that what they do is "normal" and is "no big deal." They ask their elders who fret about Net pornography, "What's all the fuss about?" Being *children of the Internet* in the developed North, and living in fairly privileged surroundings, they have little cognizance that the majority of the world is not connected, nor will ever be connected.

Corporations and governments are investing considerable energies in trying to find ways to increase the connectivity, not only of citizens in their own countries, but in other

countries as well. The prospect of a global electronic marketplace with over a billion customers ready to type their credit card number into a web form causes corporations to salivate over possible profits at relatively low cost. Similarly, governments are anxious to sponsor the global digitization and distribution around the globe of their national cultures, including curricular content and training materials in distance education programs. The main stumbling block in all of these dreams is the very low number of world citizens connected to the Internet and their lack of IT skills and "Net readiness". If the 8% who are wired can be raised to even 30%, the size of this digitized marketplace would indeed be staggering. But the dimensions of the Internet outlined in this paper stand in the way. Poverty, low income, unemployment, connectivity problems, lack of interest in present Internet content, and lack of computer skills and predispositions are major deterrents to a more global Internet. When we add to this mix race, ethnicity, gender, aging, low education, and disabilities, we begin to see how formidable the challenge is to building bridges, ramps, cloverleaves, and ladders, not only laterally between the socio-economic dimensions (such as among education, income, and race), but also vertically across the divide. My own prediction is that, if the Internet does not die from traffic jams in the "pipeline" or from spams, viruses, and junk e-mail, it is in danger of going into a kind of *rigor mortis*. The economic, social, educational, gender, age, racial, national, and political fault lines separating the digital haves and digital have-nots appear not only on the surface of the temporary bridges, ladders, ramps, cloverleaves, and byways connecting the haves and have nots, but run much deeper beneath the surface in the fissures of global and local society. As technology becomes more expensive, the rich will simply move up the digital ladder and purchase the more expensive computers and high- speed Internet access; the poor, to the extent that they own any technology at all, will be left with the more outdated computers and slower Internet access. Some recent U.S. figures are revealing in this regard. There are consistent socio-economic differences between those who have the slower dial-up connections to the Internet and those who have the faster high-speed access. Upper-income households are more likely to have high-speed access; low-income households are more likely to have slower dial-up connections. Similarly, younger, highly educated whites are more likely to have high-speed access. Older, less educated blacks and Hispanics are more likely to have the slower dial-up access (NTIA, 2000: 101-104). The digital divide, or the inequality/technology bar, just moved up another notch. Marshall McLuhan was too optimistic when he coined the phrase "global village." He should have qualified it into the "global village for the 8% of the world who are the digital haves. This is a privileged intra-class network sitting at the top of the globe.

As noted earlier, one of the "fault lines" in the digital divide and the Internet more generally, is language. Although the English language is currently dominant on the Net, it has started to decline relatively as more and more individuals and organizations using non-English languages create content for the web. Many studies have shown that citizens of various countries and cultures prefer to view web sites, and to communicate, in their own languages. Individuals and organizations of each country will tend to construct web sites to appeal to national and regional audiences in their own indigenous languages. However, once viewers in other countries cross national, cultural and linguistic boundaries to view these sites, there is a clash between one's mother tongue (language first learned and spoken at home), and the digitized content presented for viewing on one's computer

monitor. If one projects this linguistic uncertainty into the future, four alternative outcomes are possible.

First, on viewing web content from a different culture, language, and country, the Internet surfer will turn away and go to a different site in his or her own language. Search engines are now constructed to accept hits only in languages specified by the searcher. Under this scenario, there is thus no learning of another language or culture, no obvious cultural or linguistic clash, and each language and culture is preserved up to a point (at least there is no sustained cultural-linguistic destruction).

Second, on confronting a foreign language, the web surfer will get the dictionary out and try to translate and interpret the content she or he is viewing. This requires a high degree of motivation, commitment, time, and perseverance. It is unlikely that many viewers will respond in this manner. However, to the extent they do, this outcome could potentially lead to considerable inter-cultural understanding across the globe were it to develop on a broad scale.

Third, the viewer could react with hostility and aggressively attack the authors of the Internet content, such as sending them threatening e-mail messages, telling them to translate their web content into the language of the surfer, or "get off the Net." It is unknown to what degree this type of linguistic harassment has occurred. We do know that many corporations will either not respond to non-English e-mail, or will respond by saying they will accept and deal only with e-mail in the English language. Harassment and non-response will not lead to mutual cultural understanding and could lead to an all-out cultural and linguistic flaming on the Net ("flaming" is a favourite Net pastime of aggressive individuals with too much time on their hands).

Fourth, in the last few years a number of corporations have been offering almost instantaneous translation of Internet content from one language to another language. The viewer copies a selected passage into a web form, selects the language of the text, and the language to which the text is to be translated, and hits the "OK" button. The product is often a less than faithful translation of the original text. Admittedly, this software is still in its infancy. It is improving in quality and the faithfulness and nuances of the translations. The day will soon arrive when artificial intelligence will automatically translate "on the fly" an entire foreign language web site into a language of the viewer's choosing. However, given the power of the English language on the Net and given its diffusion across the globe within a small elite of business and government officials and the academic-scientific-professional elite, it is not too risky to predict that English is fast becoming the language of the digital haves, leaving indigenous national, regional, and local languages to the vast majority of the digital have-nots. This will further divide the world into two cultures: a rich digitized English culture, and much poorer non-digitized non-English languages. Rather than breaking down the digital divide, this will further solidify the guilt between the haves and have-nots. This will lead to a future in which the Internet is accessed and enjoyed by a small minority of rich global villagers sealed off from a mass of non-digitized poor speaking local dialects not understood by the digital elite.

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