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Technology and Social Inclusion

Rethinking the Digital Divide

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Conclusion: The Social Embeddedness of Technology

Two of the most astute analysts of the sociology of the Internet are Paul DiMaggio and Eszter Hargittai of Princeton University (see, for example, DiMaggio et al. 2001; Hargittai 1999; 2002; in press). In a recent piece, DiMaggio and Hargittai (2001) discuss the issue of the digital divide. They assert that now that Internet diffusion rates have increased, scholars should shift their attention from the digital divide—inequality between haves and have-nots based on dichotomous measures of access—to digital inequality, by which they mean differences among people with physical access to the Internet. Digital inequality, from their perspective, encompasses five main variables: technical means (inequality of bandwidth); autonomy (whether users log on from home or at work, monitored or unmonitored, during limited times or at will); skill (knowledge of how to search for or download information); social support (access to advice from more experienced users); and purpose (whether they use the Internet for increase of economic productivity, improvement of social capital, or consumption and entertainment).

I agree with DiMaggio and Hargittai's points but believe they need to be extended. Specifically, the broad, multifaceted approach they bring to bear on issues of digital access and equality needs to be applied not only in situations in which Internet penetration is high but also in situations in which it is low and just beginning. Indeed, it is precisely in such situations that the promotion of skills, social support, and autonomy, while carefully paying attention to the underlying purpose, can be most important.

An example will illustrate the point. During a research trip to Latin America, I met with the president of a national telecenters project. The president, a Westerner, had traveled to this particular Latin American country to establish the project on behalf of the foundation for which he worked. He and the foundation were determined to set up a large number of telecenters as quickly as possible so as to bring computers and Internet access and training to great numbers of people. By demonstrating results, they hoped to impress the business and philanthropic communities in their home country and thus raise further funds for the project.

The president explained to me that in order to achieve the goal of setting up many centers it was necessary to partner with local community organizations, which entailed a process of contact, communication, discussion, and negotiation. He made clear how distasteful he found this task. As he explained, he simply wanted to get his centers up and running as soon as possible, and he had little patience with the slow and tedious process of building local partnerships and addressing people's questions and concerns. He also explained to me his pride that his project was nonpolitical and told me that other telecenter projects in the country were hindered by their political agendas. Finally, I could see that he kept a tight rein on the overall project; though local staff was involved in helping run the project, he—a newcomer to the country without prior experience in the region—maintained the role as the project president and carried out much of the local negotiations.

I was able to visit one of the project's telecenters—in fact, the only telecenter it had managed to set up thus far. The telecenter had been established at the office of a local community organization in a poor neighborhood of a large city. There were two computer labs there, one for training on computer skills and one for Internet access. The "nonpolitical" nature of the training was evident. In contrast to the Schools for Information Technology and Citizens' Rights (see chapter 5), this telecenter appeared to devote no attention to integrating social or community issues into the curriculum. The training I witnessed consisted of decontextualized exercises. The course offerings were all based on particular software programs rather than on use of these programs for meaningful ends. There was not much evidence of involvement of the community organization in helping define the instructional curriculum or the direction of the telecenter project, although some of the community organization's staff members were deployed to hand out elaborate brochures the national project had developed. At least judging by that evening, community response was poor; only a few people showed up for computer training, and I didn't witness any show up for Internet access.

I spoke to the coordinator of the partner community organization, a woman who had patiently built the neighborhood organization over two decades. She expressed strong concern about the direction the telecenter was taking. Referring to the Western project president, she told me, "he wants to reach numbers, we want to reach people." When I asked her what she meant, she explained that he was aggressively pushing them to deliver any kind of training to as many people as possible as quickly as possible in order to show results to outside funders (a point that the president himself confirmed), while she and her organization were more interested in taking the time to design and implement programs that would really make a difference in people's lives.

In all fairness, it is important to point out that real-world contradictions do arise between reaching "numbers" and reaching "people," that is, between reaching larger numbers of people in quicker and less intensive ways and reaching smaller groups of people in slower and more extensive ways. These are trade-offs that any type of social development project must weigh, and the need to deliver results to funding sources is one consideration that sometimes has to be taken into account. However, in this case, no such trade-off was witnessed; by emphasizing numbers *instead of* people's real needs, the project failed to reach either people *or* numbers. The problem appeared to lie in large measure with the Western foundation trying to carry out its work in a "nonpolitical" fashion—in other words, in its *own* political fashion, which deemphasized the value of community participation and mobilization—without taking into account or addressing local political concerns or views.

As this example and others presented in this book demonstrate, social context, social purpose, and social organization are critical in efforts to provide meaningful information and communication technology (ICT) access, whether in developed or developing countries. Issues of what constitutes skill and how it is developed, what purposes are served by gaining access, who develops autonomy and how, and what kinds of social resources are mobilized are all crucial for promoting social inclusion. Since I have covered wide ground in making these points, I now try to tie the diverse threads together by reviewing the question that has driven this book, this time from a theoretical perspective.

Social Embeddedness of Technology

The framework of the digital divide implies that technological and social contexts can be separated from each other and that these two separate contexts interact through a mechanism of causality. Programs are thus designed to solve the technological problem is the belief that this will ameliorate one or more social problems. This separation is seen conceptually in one of two ways: determinism or neutralism. Media determinism characterizes technology as existing apart from society and exerting an independent impact on it. We are concerned, for example, about the impact of television on children, about the impact of computers on learning, and about the impact of the automobile on society. And, in each of these cases, we *should* be concerned about the role of technology, but none of these impacts can be analyzed outside of the particular social contexts at hand.[1] There is a complex mutually evolving relationship between a technology and broader social structures, and the relationship cannot be reduced to a matter of the technology's existing on the outside and exerting an independent force.

Those involved in educational applications of technology confront attitudes of technological determinism regularly. How many times have administrators or funders demanded to know the impact of computers on learning, without any consideration of the context in which computers are used or the purposes they are used for? This focus on the omnipotent machine, removed from considerations of use or context, has been criticized as the "fire" model of education technology, based on its notion that a computer in a classroom will automatically generate learning in the same way that a fire automatically generates warmth (Dede 1995; 1997).

Seemingly in opposition to determinism, but actually overlapping with it, are neutralist (or instrumental) theories of technology. From this perspective, technology is devoid of any particular content or values. Rather, it is a neutral tool, indifferent to the ends for which it can be employed (see Feenberg 1991). From this perspective, the computer is not particularly good or bad; it is just a piece of metal that can be used for any purpose.

This last position has a lot of commonsense appeal, and it is in part a corrective to determinism. But, like determinism, it fails to account for the social embeddedness of technology. Technologies may not be good or bad in themselves, but neither are they neutral (Kranzberg 1985); rather, they carry with them certain values based on their own history and design (Feenberg 1991).

The personal computer and the Internet, for example, emerged in a particular U.S. social context, and their designs reflect the values and perspectives of the American engineers who worked on them. For example, for character encoding, computer engineers developed and adopted the American Standard Code for Information Interchange (ASCII 2001; Jennings 2001). As a seven-bit system, ASCII only allows for the representation of 128 (2^7) characters; once lower-case and upper-case letters, numbers, and standard punctuation marks were included, there was no room left over for letters with diacritical marks (as are common in the alphabets of many European languages), or for characters and symbols of the diverse non-Roman alphabets around the world. Eventually a more flexible system called Unicode has emerged, but it has not yet become standardized in the same way that ASCII has. The limitations of ASCII help explain why English and other Romanized languages got a head start on the Internet, a bias that strongly influenced who has been able to access the Internet, what materials are published there, and what broader social systems and structures are privileged (see chapter 4).

Another bias of personal computing is the desktop interface, which is based on an office metaphor (e.g., files and folders) rather than on other possible metaphors (a kitchen, a tool shed, a farm), thus being more accessible to people with certain kinds of prior experiences (Burbules and Callister 2000; Selfe and Selfe 1994).

These are just two of the many ways that coding decisions—based on the social history of ICT and the viewpoints of U.S. engineers—have influenced the diffusion and accessibility of computers and the Internet. Many similar examples, including the relation of computer coding to issues of intellectual property, privacy, free speech, and sovereignty, are discussed by Lessig (1999). And there are far broader design issues than coding. For example, the social milieu in which ICT arose has also shaped a broad range of research and development decisions, affecting issues such as the cost of hardware and software, the difficulty of using computers, the range of devices that can be used for computing and online communication, and the transmission media of telecommunications. None of these can be considered neutral.

The significance of coding and other design issues once again demonstrates the complex interrelationship of technology and society in contrast to a simplistic notion of outside impacts. Whereas the deterministic view sees impact as inherent in the technology and the instrumental view sees impact as within the domain of the individual user, neither perspective captures the ecological intertwining of technology and society.

The limitations of media determinism and neutralism are illustrated by a discussion of the printing press. There is no doubt that European society changed a great deal in the centuries following the Gutenberg revolution. The affordability and wide diffusion of printed texts laid the basis for modern scholarship and science by making published data more readily available in thousands of copies. The publication boom of the fifteenth to seventeenth centuries aided the Protestant reformation by providing an alternative source of communication and authority to that of the Catholic hierarchy. Education was transformed, as teachers and students were relieved of the burden of slavish copying. Students who took full advantage of technical texts, which served as silent instructors, "were less likely to defer to traditional authority and more receptive to innovating trends" (Eisenstein 1979, 689). The very format of the printed book—with tables, figures, footnotes, and indexes—contributed to new ways of categorizing and conceptualizing information (Eisenstein 1979; McLuhan 1962).

However, while the invention of movable type made these changes possible, it did not autonomously bring them about. In fact, movable type was invented in China more than 400 years before its development in Europe (Carter 1925) but was little used in Asia. Its widespread diffusion in Europe depended directly on other changes already underway there, including the emergence of a capitalist class, colonialism, and "a heightened sense of individuality and personality, of nationalism and secularism" (Murray 1995, 28). Nor can the printing press be seen to have caused the spread of mass literacy in Europe because that did not occur until several centuries later. It was the industrial revolution, not the industry of printing, that brought about mass print literacy and helped shape its current characteristics (see Tuman 1992). In other words, rather than the printing press being introduced from the outside and having an impact on society, it emerged from the inside and interacted with other elements of society in an ecological fashion. As Neil Postman (1993, 18) put it, "Fifty years after the printing press was invented, we did not have old Europe plus the printing press. We had a different Europe".

This illustrates well the difference between what Levinson (1997) refers to as "hard" and "soft" media determinism. Hard determinism holds that technological change automatically causes social change, an assertion that is easily disproved by the example of the differential impact of movable type in Asia and Europe. In contrast, soft determinism enables social change but does not in and of itself bring it about.[2]

As exemplified by the history of the printing press, any technology—especially a major new medium of communications—does not exist outside a social structure, exerting an independent impact on it. Nor is it a neutral tool to be deployed in a haphazard fashion. Rather, technological and social realms are highly intertwined and continuously co-constitute each other in a myriad of ways. This co-constitution occurs within organizations, institutions, and in society at large.

ICT and Organizations: Sociotechnical Networks

The research tradition that analyzes the social embeddedness of ICT in organizations is knows as social informatics. This approach emerged at the University of California, Irvine, in the 1970s with a series of studies on the role of computerization in a wide array of organizations, including government agencies, factories, banks, schools, and offices (see Kling 1991). The research, conducted by teams of scholars from computer science, public administration, and political science, yielded important insights about the computerization of organizations.[3] Perhaps the most significant was that computing could not be understood as a separate tool but was rather part of an overall package. Kling and Scacchi (1979; 1982) explain the difference between a tool and a package model as follows:

> [The tool metaphor suggests that] one can safely focus on the device to understand its use and operation. In contrast, the package metaphor describes a technology which is more than a physical device. . . . The package includes not only hardware and software, but also a diverse set of skills, organizational units to supply and maintain computer-based services and data, and sets of beliefs about what computing is good for and how it may be used efficaciously. Many of the difficulties users face in exploiting computer-based systems lie in the way in which the technology is embedded in a complex set of social relationships. (1982, 6)

One of the key studies that informed this research agenda was a national investigation of computer use by local governments in 500 U.S. cities (Danziger et al. 1982). The study found that the equipment and facilities available were only a minor part of the impact of computer technology on local government. Much more significant was the organizational systems set up to regulate and control computing, and the visions, competing interests, funding mechanisms, and struggles of key actors, including managers, policymakers, vendors, employees, and citizens. The researchers concluded that the key to understanding the computing system of an organization was not what kinds of equipment and facilities it has but rather the kinds of things people do with them (9).

Social informatics later grew into a national and international research tradition (see Kling 1999; 2000). Scholars in this field investigate the ways in which technology-in-use and social worlds co-constitute themselves in highly intertwined fashion (Kling 2000). The original computing package model has broadened to the concept of sociotechnical networks, explained by sociotechnical models that Kling has nicely summarized (table 7.1).

The studies discussed in this book draw on and reinforce the concept of the sociotechnical network. They provide further evidence that looking at what people do rather than merely at what equipment they have is necessary to make effective use of ICT for social change and inclusion.

Table 7.1
Standard Models vs. Sociotechnical Models of ICT

Standard (Tool) Models	Sociotechnical Models
ICT is a tool.	ICT is a sociotechnical network.
A business model is sufficient.	An ecological view is also needed.
One-shot ICT implementations are made.	ICT implementations are an ongoing social process.
Technological effects are direct and immediate.	Technological effects are indirect and involve different time scales.
Politics are bad or irrelevant.	Politics are central and even enabling.
Incentives to change are unproblematic.	Incentives may require restructuring (and may be in conflict).
Relationships are easily reformed.	Relationships are complex, negotiated, multivalent (including trust).
Social effects of ICT are big but isolated and benign.	Potentially enormous social repercussions from ICT (not just quality of work life but overall quality of life).
Contexts are simple (a few key terms or demographics).	Contexts are complex (e.g., matrices of businesses, services, people, technology, history, location).
Knowledge and expertise are easily made explicit.	Knowledge and expertise are inherently tacit/implicit.
ICT Infrastructures are fully supportive.	Additional skill and effort needed to make ICT work.

Source: Adapted from Kling (2000) with permission of *The Information Society*.

ICT and Institutions: Shaping the Structure of Relationships

The contributions of social informatics are greatly enhanced if we overlay them with an institutionalist perspective. The study of institutions has long been important to social theory, especially in the last thirty years, as a "new institutionalism" has swept through the fields of history, sociology, economics, and political science (DiMaggio and Powell 1991; Goodin 1996). Although this new institutionalism takes on different meanings in different disciplines, in the broadest sense it can be seen as an attempt to "blend both agency and structure in any plausibly comprehensive explanation of social outcomes" (Goodin 1996, 17). This in essence overcomes the false contradiction between determinism and neutralism, by focusing on how the influence of individual agents and of social structures are together mediated by institutionalized ways of thinking and acting.

An institution is different than an organization or a collection of organizations. Rather, it refers to the types of routinized interaction (also known as scripts and schema; see DiMaggio and Powell 1991) that typify and shape human activity in a defined realm. Institutions serve to structure relationships between people by inducing them to insert themselves into a particular order and way of interacting (Agre 2001a). For example, the institution of academia is not just a collection of universities but a way in which relationships between undergraduate students, graduate students, instructors, professors, and staff are formalized and structured. The tenure system, the scholarly conference, the job search process, and the dissertation process are just a few of the elements that contribute to the institution of academia.

Technologies do not exist apart from institutions, exerting an external impact, but are part and parcel of them. The institution shapes the workings of the technology while the technology shapes the workings of the institution. The microwave oven has become part of, and helped shape, the institution of "dinner" (at least in many countries), and the institution of dinner has in turn shaped the development of the microwave oven (e.g., by influencing the features that manufacturers have chosen to include). This techno-institutional interaction is especially powerful in relation to ICT because of its great generality and adaptability (Agre 1999b). Though a microwave oven heats food, ICT "is equally at home in offices, factories, trucks, telephones, shirt pockets, spacecraft, thermostats, intensive care units, and kindergartens" (para. 1). In addition, while all technologies serve to structure human relations (think, for example, how the microwave oven has facilitated the entry of women into the workplace), many do so as a by-product of their main function. In contrast, the very purpose of ICT is to restructure human communications and relations. For all these reasons, ICT is bringing about a "thorough renegotiation of the ground rules" of every institution (Agre 1999b, para. 1).

The notion of the institutional embeddeness of technology offers a better alternative than the concept of a digital divide or digital solution.

Returning to the theme of distance education (see chapter 5), the digital divide framework can lead one to oversimplify the potential positive contribution of distance education by taking at face value the notion that ICT can extend educational opportunities to previously excluded groups. While this is one possible outcome, it is not the only or necessarily most likely one. A more refined institutional analysis is required to evaluate the actual role that ICT is playing in academia. For example, one of the functions of academia is to sort out students, and an elaborate array of mechanisms (admissions, test scores, financial aid, advising, grading) and organizational forms (different tiers and levels of colleges and universities) are used to that end. Only when considering the institutional function of social sorting is it possible to evaluate the possible impact of distance education. As seen in the discussion in chapter 5, distance education is as likely to magnify this process of sorting as it is to undermine it, by amplifying trends toward more unequal higher education.

Similarly, efforts to make use of ICT to meet the needs of rural villagers should be based on analyses of relevant institutions, such as banking, health care, and local government. The starting point for a progressive consideration of ICT in any institution should not be the digital divide and how to overcome it but rather the broader social structures and functions of the institutions and how ICT might be used to help make them more democratic, equitable, and socially inclusive.

ICT and Society: Applying Critical Theory

Finally, a key related concept is a critical theory of technology (Feenberg 1991; 1999b; Winner 1986). Drawing on the broader critical theory of the Frankfurt school, Feenberg situates technology within the underlying unequal power relationships that exist in society. The bias of technology reflects these power relationships, as seen, for example, in how the Internet's historical bias for English reflects the social, political, economic, and technological power of the United States vis-à-vis other countries. The diffusion and use of technology are understood as a "scene of struggle" (Feenberg 1991, 14).

The importance of critical class analysis is seen, for example, by considering the role of ICTs in rural poverty alleviation in South Asia. As a recent essay points out ("ICTs" 2001), poverty alleviation in India is not a matter of service delivery, but one of enhancement of agency of the poor, based on the transformation of class, caste, ethnic and gender relations within which the poor exist. The "technology as solution" approach (Heeks 1999) ignores the social structures that determine both access and impacts. While cheapening technology certainly has a role to play in making it more acceptable to the poor, social structures are crucial in determining who is able to access any technology and use it beneficially.

The essay points out how social structures of poverty vary according to region in India. In the hill-forest areas, communities of indigenous people supply raw materials (e.g., timber) and ecosystem services (e.g., hydrological, biological). With almost the entire community suffering from poverty, class contradictions are minimal. ICT can be used to enhance people's skill and information so that they can improve their productivity (by learning more about the delivery of ecosystem services). In contrast, in the Indian plains, a major cause of poverty is landlessness, and huge contradictions exist between the landless poor and the large landholders. Projects that increase agricultural productivity—for example by providing information about market prices—may have a small trickle-down effect to the landless poor but cannot in themselves qualitatively undo the underlying problem of landlessness. For this to occur, information must be combined with mobilization, and ICT projects will be in the end most meaningful if they find ways to lend support to mobilization efforts (for example, by linking nongovernmental organizations that are active among the landless poor).

In summary, the organizational, institutional, and societal levels of analyses all overlap. Each points to the critical role of social structures in shaping how technology is diffused, and the corresponding importance of social analysis and goals in the planning of ICT development projects.

Technology for Social Inclusion

The concept of a digital divide has helped focus public attention on a critical social issue: the extent to which the diffusion of ICT fosters stratification and marginalization or development and equality. With the world's attention focused on this problem, it is now the time to put forward a more refined conceptual framework to the problem and a more informed policy and research agenda.

The overall policy challenge is not to overcome a digital divide but rather to expand access to and use of ICT for promoting social inclusion. The policy implications of this will vary according to circumstance, but I touch on a few issues here, summarizing some of the main themes discussed in this book.

First, analyses of the problem must begin with examination of social structures, social problems, social organization, and social relations rather than with an accounting of computer equipment and Internet lines. An accounting of equipment is part of the overall analysis, but a fairly small part; if interventions are designed to address social problems, they must be planned by focusing on the overall structures and relationships that give rise to those problems. Analyses must take into account not only social problems but also best social practices. Technology can often serve to amplify already existing practices; by examining how people in a particular realm currently learn, collaborate, share, and succeed, technological interventions can be sought that amplify these practices (Agre 1998).

Once social problems or goals are identified, programs should be based on a systemic approach that recognizes the primacy of social structure and promotes the capacity of individuals or organizations for ongoing social change through innovation of those structures using technology. Corea (2000) discusses this strategy in depth, pointing out that information technology implementations often create only superficial change, with organizations returning to their ingrained ways once the new systems have been "absorbed into the previous web of calcified inefficiencies" (9). Rather than just foisting technologies haphazardly on people, a better solution is to foster the "long-term nurturing of behaviors intrinsically motivated to engage with such technologies" with the goal of achieving "an 'innovating' rather than a 'borrowing' strategy of growth as a means to reduce technological disparities" (9). This can bring about a "catching up process" through development of capacity "in the generation and improvement of technologies, rather than in the simple use of them" (Perez and Soete 1988, p. 259, quoted in Corea 2000, 9). All of this requires changes in the social environment to facilitate "the learning of new behaviors that propagate continuous improvements in conditions of living" (Corea 2000, p. 9). This process of innovation might take many forms. Rural teachers might learn how to create their own technology-based materials based on local conditions rather than only using commercial software developed for other contexts. A crafts cooperative might learn how to develop and manage its own Web site rather than just posting its announcements on somebody else's. Nongovernmental organizations might learn to establish and run their own networks of telecenters rather than just attending cyber cafés.

In promoting such efforts and programs, it is essential to understand and exploit possible catalytic "effects" of ICT. Many important changes in social relations may come from the human interaction that surrounds the technological process rather than from the operation of computers or use of the Internet. For example, a new computer laboratory in a low-income neighborhood may also become a meeting hub for at-risk youth and college student mentors. Or the involvement of community members in planning the laboratory may bring together new coalitions that can also work for other types of community improvement. The social importance of ICT in the information economy and society means that ICT initiatives often have powerful leveraging potential that can be used to support broader strategies for social inclusion.

The roles of leadership, vision, and local "champions" (McConnell 2000, 8) are crucial to the success of ICT projects for social inclusion. A common mistake made in ICT development projects is to make primary use of computer experts rather than of the best community leaders, educators, managers, and organizers. Those who are capable of managing complex social projects to foster innovative, creative, and social transformation will likely be able to learn to integrate technology into this task. On the other hand, those with technological skills, but lacking understanding of the complex human issues at hand or the leadership ability to address them, will usually prove less effective (see Agre 1998).

The process of organizing, designing, implementing, and evaluating ICT projects must itself be open to innovation and flexibility. Good big things come from good small things, and room for innovation, creativity, and local initiative is critical to give the space for good small things to emerge. The discussion of education projects in chapter 5 pointed to the need for flexible pilot programs as part of the development process. Scalability is of course an important aspect, and the potential for scaling up has to be part of the formative and summative evaluation of pilot programs. But lock-step, centrally organized, large-scale initiatives with no room for local experimentation and innovation do not meet the needs of a rapidly changing information economy or society.

Finally, market mechanisms can be effective for expanding access to computers and telecommunications but they are not sufficient. Governments need to consider in what situations restrictions on markets are hindering expanded access, and take steps to end such restrictions. Evidence suggests that these steps should include removing import tariffs on computer hardware and software and ending monopoly control of telecommunications (Hargittai 1999; Wallsten 2001). At the same time, for a variety of reasons—including the limited purchasing power of the poor—market mechanisms will clearly be insufficient for providing universal access. Funds for research and development on low-cost computer and Internet alternatives, incentives for extension of telecommunications services to rural areas, and the backing of research on the causes and consequences of restricted ICT access are all ways that governments can improve on the power of markets without undermining them. Initiatives that harm the expansive potential of markets, for example, by prematurely locking in proprietary infrastructures, should be avoided.

Expanded Research

A technology for social inclusion approach also requires an expanded research agenda. Some important steps in this direction have already been taken. For example, the U.S. National Telecommunications and Information Administration has refined its measures of physical access to computers and the Internet to include more gradations of access (whether or not people have broadband Internet access) and to target additional populations threatened with social exclusion (e.g., the disabled). Such graded measures of a variety of populations should be encouraged in a wide array of research studies.

At the same time, research should be expanded in other areas of resources related to the availability of content in specific languages, the language choices made by people online, the skills and "electronic literacies" that users have, and the relation of community and social support to ICT use (DiMaggio and Hargittai 2001; Hargittai, in press; Hoffman and Novak 2001).

Beyond issues of access, it is also critical to study patterns and types of usage. For example, in school settings most research has thus far gone into measuring how much equipment and infrastructure schools have; much less has gone into examining how computers and the Internet are actually used with different school populations. These emphases should be reversed, with the larger priority given to examining use.

And beyond use, there is also the question of outcome. As DiMaggio and Hargittai (2001, 17) suggest, studies can "investigate variations in rates of return to technology use for different subgroups within the population." These rates of return can refer to a wide range of issues related to learning, emotional satisfaction, social capital, participation, income, and other forms of social or economic benefit. For example, one recent outcome study found that disadvantaged minorities pay the same prices as white buyers when purchasing cars online in the United States in contrast to the 2.1% price difference (+$500 USD) they pay when purchasing cars in person (Morton, Zettelmeyer, and Silva-Risso 2001).

It is especially important to supplement individual-level research with "analysis of institutional factors that shape and modify over time the relationships between individual characteristics and individual outcomes" (DiMaggio and Hargittai 2001, 17). For example, in researching telecenters, correlations can be examined between the types of location, facilities, ownership, administration, and purpose on the one hand, and the individual characteristics and outcomes of users on the other hand.

These expanded research goals will require a corresponding expansion of methods and approaches. Methods required will include observational designs, analyses of user behavior, cross-national comparisons, international surveys, and political-economic research on regulatory issues (DiMaggio and Hargittai 2001; Hargittai, in press). Particularly important will be longitudinal ethnographic studies that can reveal the ways in which social structure, technological innovation, and human development are intertwined, as Zuboff's (1988) study showed at an earlier stage of ICT diffusion. These types of qualitative studies of technology in social context will not always yield precise answers, but as one leading statistician noted, "far better an approximate answer to the right question, which is often vague, than an exact answer to the wrong question, which can always be made precise" (Tukey 1962, 13).

This proposed research agenda is broad and ambitious but not impossible. It will require strong disciplinary research methods (e.g., in sociology, anthropology, economics) together with equally strong interdisciplinary content knowledge of the wide variety of scholarly fields that issues of ICT access and use encompass. By bringing together teams of scholars from different disciplines, backgrounds, and cultures—and encouraging individual scholars to cross disciplinary boundaries—research on ICT in society can help bring about a new scholarly paradigm that is more in line with the imperatives of a postindustrial society in which knowledge and disciplines cannot be tightly bound. If flexibility, creativity, and many-to-many multimodal interaction are hallmarks of the information era, they will also be the hallmarks of the scholarship that the era demands.

Conclusion

Walter Ong, a prominent scholar of orality and literacy, once wrote that "technologies are not mere exterior aids but also interior transformations of consciousness, and never more than when they affect the word" (1982, 82). The statement has been criticized for being deterministic, but I don't find that to be the case. It simply refers to the fact that technology and the mind cannot be separated, as illustrated by the intertwining of the blind man's sensory perception with his walking stick (see chapter 5).

Just as technology becomes part of the neural network of the mind, it also becomes part of the social network of humanity. And never has this been more the case than with information and communication technologies, which function not only as the electricity of the twenty-first century but also as the printing press, library, television, and telephone, not to mention school, social club, mall, debating society, and gambling den. The Internet is not so much a tool as a new social space that restructures social relations (Poster 1997).

As researchers of ICT and its social context, we may sometimes tally up computers and Internet accounts; however, this is not an end in itself but rather part of a broader effort to better understand the process of technology use and the role of ICT in human and social development. Similarly, as social advocates, we may work to distribute computer equipment, but again as one step toward a larger purpose of helping people participate fully in the information economy and network society. That participation requires not only physical access to computers and connectivity, but also access to the requisite skills and knowledge, content and language, and community and social support to be able to use ICT for meaningful ends. The tasks are large, but so is the challenge: reducing marginalization, poverty, and inequality and enhancing economic and social inclusion for all.

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