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Dissecting the "Digital Divide": A Case Study in Egypt

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For the last decade, the concept of a "digital divide" has framed people's understanding of technology's relationship to equity and development. This article critiques theoretically the digital divide concept and supports this critique by examining a case study of technology and education in Egypt. The study illustrates the social embeddedness of technology and the intertwining of computer access with broader issues of political power, thus refuting simplistic notions of divides to be overcome through provision of equipment.

Keywords digital divide, education, Egypt, international

Since first emerging nearly a decade ago, the concept of a "digital divide" has captured the attention of policy makers and social activities. However, some have suggested (e.g., Cisler, 2000; DiMaggio & Hargittai, 2001; Jarboe, 2001), and I agree, that the concept provides a poor framework either for social analysis or for policy development and implementation. In this article, I first briefly critique the digital divide concept. I then illustrate the problems with the underlying framework by examining a case study of a national educational technology program in Egypt.

THE UN-DIVIDE THAT'S NOT DIGITAL

The very name *digital divide* reveals the concept's confusing basis. First, a "divide" implies a bipolar division between the haves and the have-nots, the connected and the disconnected. Yet, as pointed out by Cisler (2000), connectivity falls along a continuum, rather than into a bipolar split. Compare, for example, a professor at UCLA with a high-speed "Internet II" connection in her office, a student in Seoul who uses a cybercafé, and a rural activist in Indonesia who has no computer or phone line but whose colleagues in her nongovernmental organization (NGO) download information for her. The notion of a binary divide is thus inaccurate and can be patronizing, as it fails to value the social resources that diverse groups bring to the table. For example, in the United States, African-Americans are often portrayed as being on the wrong end of a digital divide (e.g., Walton, 1999), when in fact Internet access among Blacks and other minorities varies tremendously by income group, with divisions between Blacks and Whites decreasing as income increases (National Telecommunications and Information Administration, 2000).

Second, and even more significantly, the stratification that does exist regarding access to online information has very little to do with the Internet per se, but has everything to do with political, economic, institutional, cultural, and linguistic contexts that shape the meaning of the Internet in people's lives. Thus the inequality that does exist is social, not digital. The notion of a digital divide suggests that the divide can be breached by giving someone an Internet address and e-mail account. However, little data exists to support this. In fact, it is safe to predict that within one to two decades, Internet access will be ubiquitous in the United States, connecting not only computers but also televisions, game machines, and mobile phones. Yet just as the ubiquitous presence of other media, such as television and radio, has done nothing to overcome information inequality in the United States, there is little reason to believe that the mere presence of the Internet will have a better result. If anything, recent economic trends suggest otherwise (Castells, 1996).

TECHNOLOGICAL DETERMINISM

While the name itself is not of essential importance, the ideas behind the name are. And from popular interpretation to public policy, it is clear that the underlying framework of a "digital divide" is technological determinism—in other words, the view that the mere presence or absence of a technology has a determining affect on behavior and social development (see, for example, Ellul, 1990). Technological determinists range from those who see media's impact

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as automatically good to automatically bad, but they agree on the overriding role of technology in determining social change (see discussion in Feenberg, 1991). This results in an emphasis on bridging the technological gap through the distribution of hardware, software, and online networks. As Kling explains,

> [The] big problem with "the digital divide" framing is that it tends to connote "digital solutions," i.e., computers and telecommunications, without engaging the important set of complementary resources and complex interventions to support social inclusion, of which informational technology applications may be enabling elements, but are certainly insufficient when simply added to the status quo mix of resources and relationships. (cited in Warschauer, 2003, pp. 7–8.)

In critiquing the notion of a digital divide, it is of value to examine another great "divide" which had been earlier proposed and rejected, that of an alleged "great literacy divide" (see discussion in Gee, 1996; Tyner, 1998). According to the notion of a literacy divide promoted by scholars such as Goody (1968, 1973; Goody & Watt, 1988) and Havelock (1963, 1986), individuals and societies could be divided up into whether they were literate or not, with far-ranging cognitive and social consequences automatically determined by this distinction. Over the last 20 years though, in-depth research, including that by Scribner and Cole (1981) with the Vai people in Liberia, who were literate in their own language but had never gone to school, revealed that literacy in and of itself brought virtually no cognitive or social benefits, and that almost all the benefits associated with literacy came instead with the other social activities that surrounded it, such as schooling. Critical theorists of literacy now agree on the following points:

- There is not just one, but many types of literacy (e.g., Cope & Kalantzis, 2000; Gee, Hull, & Lankshear, 1996).
- The meaning and value of literacy varies in particular social contexts (de Castell & Luke, 1986; Street, 1984).
- Literacies exists on a continuum, rather than in a bipolar opposition (Gee et al., 1996).
- Literacy alone brings no automatic benefit (Scribner & Cole, 1981).
- Acquisition of literacy is a matter not only of education and culture, but also of power (Street, 1984).

These points apply equally well to issues of online access. There is not one type of online access, but many; the meaning and value of access varies in particular social context; access exists on a continuum, rather than in a bipolar opposition; access alone brings no automatic benefit; and acquisition of access is a matter not only of education and culture, but also of power.

TECHNOLOGY AND EDUCATION IN EGYPT

The problems with the digital divide concept can be illustrated by a 3-year longitudinal case study I conducted of educational technology in Egypt (see Warschauer, 2003, in press). Though the term *digital divide* is seldom used in Egypt, the digital divide mindset—seeking to overcome social gaps through provision of computers and the Internet, with little regard to the context in how they are used—predominates. Though this mindset is hardly unique—and is particularly evident in educational technology efforts around the world (see discussion in Osin, 1998)—an examination of a major national program based on this framework is particularly illustrative of its problems.

My case study research examined what steps the government took to introduce computers, the Internet, and other modern technologies in the schools and what impact this introduction has had. I collected data for this research from 1998 to 2001 in the following ways:

Participant observation. During this time period, I worked in Egypt as director of educational technology on a large international development project. I participated in numerous planning committees, training programs, and activities related to technology in the schools. I took regular notes and wrote up these notes in reports following events and meetings.

Interviews. I carried out formal and informal interviews of more than 100 teachers, educational administrators, nongovernmental organization representatives, government officials, and business leaders regarding their attitudes and beliefs about technology in education.

Focus groups. I held focus group discussions with several groups of teachers from schools and universities.

Observation. I visited approximately 12 primary, preparatory (middle), and secondary schools to observe how technology is used.

Documents. In addition to reviewing books, journals, government reports, and other published literature, I also had access to nonpublished reports issued by government, donor, business, and nongovernmental agencies.

Surveys. I conducted written surveys of Egyptian educators about their access to technology and its use in the classroom.

Internet discussion. I participated in, and have access to the archives of, an online discussion group of some 200 Egyptian educators interested in technology in education.

A Magic Bullet?

Egypt faces tremendous challenges in educating its burgeoning population. There is wide consensus among both educators (e.g., Jarrar & Massialas, 1992; Tawila, Lloyd, Bensch, & Wassef, 2000) and economists (e.g., Bartsch,

1995; Fergany, 1998) about the poor performance of Egyptian schools, even when compared to that of other developing countries (Birdsall & O'Connel, 1999). Problems identified include large class sizes; poorly trained teachers with low wages and status; and a centralized, test-driven curriculum focusing on rote memorization of unimportant material (Jarrar & Massialas, 1992; Ministry of Education, 1993; Tawila et al., 2000).

Though these broader problems have not been seriously addressed, the government has devoted huge amounts of resources to integrating new technologies in schools. This effort is seen as overcoming two great divides, one international, and one domestic. At the international level, technology in education is seen as a way to leapfrog ahead and catch up with the West (Bahaa El Din, 1997; Ministry of Education, 1999). As explained by the Ministry of Education's Technology Development Center (1997):

> The whole world is undergoing an overwhelming technological revolution in information, electronics, computers, and communication. This revolution will widen the gap between the developed and underdeveloped countries. Those who master science and technology and manage information will survive, those who do not will perish, at least economically. Egypt must race against time so that it can jump on the wagon of the elite of the developed world before it is to late. (p. 79)

At the domestic level, educational technology is seen as narrowing the gap between the country's elite, almost all of whom live in the principal cities of Cairo and Alexandria, and its poor, who are spread out in urban and rural areas across the nation, especially in more remote communities of Upper (i.e., southern) Egypt. This is to be accomplished through the use of the Internet and satellite television for distance education (Technology Development Center, 1997).

To back these goals, the Ministry of Education (MOE) launched a Technology Development Center (TDC) in 1994 that has since grown to more than more than 600 full-time staff (personal interview, Ministry of Education official, May 1999). Among the steps carried out by the TDC and the MOE have been the following:

1. *The establishment of multimedia centers in the majority of Egyptian governmental schools*. These centers include a couple of high-end Windows or Macintosh computers, an LCD display for projecting from the computer to a screen, and an educational software collection. The majority are equipped, at least in theory, with Internet access, and many also have televisions, satellites, and digital decoders.
2. *The establishment of computer laboratories in the majority of Egyptian secondary schools*. These laboratories, which are in addition to the already mentioned multimedia centers, include 10–15 personal computers (based on 486 or Pentium processors) and copies of office software (word processing, presentation, spreadsheet).
3. *The development of educational software*. A large number of the TDC's 600 employees are involved in developing educational software. For the most part, this entails simply taking the content of the textbooks produced by the MOE and transferring them onto CD-ROMs.
4. *The development of satellite educational television programming*. In total, 11 of the satellite television stations are devoted to educational programming, with the idea being that teachers will take their students to the school multimedia centers to view lessons.
5. *The installation and use of a multipoint videoconference system*. This national interactive videoconference (IVC) network includes 27 IVC halls, one in each governorate (roughly equivalent to a state or country) and each having the capacity to view and project to all the other sites. The network also includes some equipment for roaming IVC networking, which can be transported on special TDC vans. The videoconference system is generally used for national teacher training programs.

No figures are available for the expense of the TDC programs. However, the amount of money is certainly substantial especially when considered in comparison to the government budget for K–12 education, which amounts to only $207 per pupil per year (Institute of National Planning, 1998).

Return on Investment

What then are the results of this investment, and how do they match the MOE's lofty goals for using technology to leap across gaps? Unfortunately, results to date are unsatisfactory in all areas. Technology has been thrust on top of a dysfunctional system, rather than used to help transform that system. The TDC itself is an add-on to the MOE that grabs up a huge portion of ministry resources but coordinates poorly with other sections of the ministry, such as the departments of secondary or basic education or the department for inservice training. Serious problems have emerged in all of the program areas.

The computers in the multimedia rooms, with two to three computers per school, are too few to make any difference. In any case, the rooms are mostly locked up, as local school authorities don't want to suffer the risk of having expensive equipment damaged. Classroom visitors representing donor agencies usually are given a special showcase presentation in a computer room. But during those same visits, when inspecting the use logs, it becomes

clear that most multimedia rooms are rarely used. This phenomenon has been reported frequently in the press. As one article (PCs, Teachers Omitted from New Curriculum, 2000) exclaimed:

> Primary School teacher Hasnaa el-Hefnawi is enraged by the decision to introduce the computer science curriculum. . . . The ministry has repeatedly tooted its own horn about how many computers it has supplied to schools. "Doesn't the minister realize that these computers are kept in school warehouses like antiques or used merely for decoration" she mused. (p. 2)

This sentiment was echoed by a teacher on an e-mail list of Egyptian educators, who complained about the technology gatekeepers at this own schools, "And the good people know only how to unplug and cover it to protect the computer from dust so as not to be damaged."

On the rare occasions when students do use these multimedia rooms, they usually sit and watch the teacher lecturing, as usual, but this time with the aid of a CD for presentation. The CDs themselves contain the exact same material as the textbooks, transferred to a new medium, with little attention given to principles of interactivity or participatory learning. Teachers who attempt to use the computers in more creative ways, even by making their own Microsoft Word or Microsoft PowerPoint files, have been informed that any activity other than using the ministry-provided software is prohibited so as to protect against viruses.

Meanwhile, the laboratories of 10–15 computers are used for a course in basic computer literacy, which focuses for the most part on mastering DOS (or, in some cases, Windows) commands. Teachers of that class, as of other classes, are not allowed to depart from the prepared curriculum, nor are they prepared to, based on knowledge, background, or training. The laboratories themselves, which could potentially offer a site for creative hands-on use by students in other subjects or after school, are forbidden to be used for anything other than the specified computer literacy courses.

Finally, Internet access is routed by telephone via MOE offices to ensure better control. This necessitates a double-connection process that rarely functions. In any case, only the official in charge of the multimedia room is given the Internet account information; neither teachers nor students are allowed to use it.

The MOE rushed to transfer its entire curriculum to satellite television programming, similar to how it transferred the curriculum to CD format. In Egypt, the textbook *is* the curriculum, so this has too often meant simply converting an unappealing textbook into a similarly unappealing television program. Scriptwriters with more creative ideas have had their efforts rejected by the directors who are under pressure to develop an enormous amount of television material in a short amount of time. In any case, satellite television is rarely viewed at all, since almost no one has bought a digital receiver at home and there is little reason to interrupt a class to bring students into a crowded television room to watch the same material that is found in their book.

The videoconference centers are used for teacher training, but the training is often based on lengthy talking-head lectures from Cairo rather than real interaction. Scheduled videoconference trainings are frequently interrupted when the system breaks down or when top ministry officials take over the system to communicate with subordinates around the country or to showcase the facilities to international visitors.

The ineffective use of videoconferencing parallels a broader problem with teacher training in new technology. Such training is generally reserved for the school computer specialists, and is mostly limited to computer operations. The computer specialists have had no training in assisting teachers to make use of computers in teaching. Teachers themselves know little about either the pedagogy of instructional technology or even basic computer operations. As one university lecturer explained to me, "we have the hardware, we have the software, but we lack the *humanware*."

The problems with educational technology in Egypt are not located solely with the MOE. Such "magic bullet" policies are often abetted by donors as well. For example, one well-funded program sponsored by the United States Agency for International Development (USAID) attempted to provide expensive state-of-the art computer laboratories in the MOE and universities, while failing to account for the complex social environments that would be required for such laboratories to actually function, let alone make an educational difference. As a result, hardware and software purchased for the laboratories remained locked up and unused for more than a year, thus losing a good portion of its value (Warschauer, 2002, 2003).

DISCUSSION

As mentioned before, these problems are not atypical in educational technology programs, in both developing and developed countries. The case study is presented here not because it represents something highly unusual, but rather because it provides a rich set of data to better understand and critique the shortcomings of the digital divide framework. In particular, there are three important lessons about the educational technology program in Egypt that are relevant for a broader understanding.

A Broader Set of Resources

The first and most obvious point is that the provision of computers and Internet connections is just one component of a broader set of resources that allow people

to make full use of technology for social development. Any attempt to categorize this broader set of resources is by nature arbitrary, but an analysis based on four general categories serves the purposes of both analysis and policymaking. These categories have emerged from my ethnographic research in Hawaii (Warschauer, 1999) as well in my case-study research in California, Brazil, and India (Warschauer, 2003), and are found as well in work by other researchers and theorists who have examined issues of technology and social inclusion in various contexts (see, for example, Aichholzer & Schmutzer, 2001; Carvin, 2000). They can be labeled (1) physical resources, (2) digital resources, (3) human resources, and (4) social resources (see Figure 1). Physical resources encompass access to computers and telecommunication connections. Digital resources refer to digital material that is made available online. Human resources revolve around issues such as literacy and education (including the particular types of literacy practices that are required for computer use and online communication). Social resources refer to the community, institutional, and societal structures that support access to ICT.

In considering these four sets of resources, it is important to realize their iterative relation with ICT use. On the one hand, each of the resources is a *contributor* to effective use of ICTs. In other words, the presence of these resources helps ensure that ICT can be well used and exploited. On the other hand, access to each of these resources is a *result* of effective use of ICTs. In other words, by using ICTs well, we can help extend and promote access to these resources. If handled well, these resources can thus serve as a virtual circle that promotes social development and inclusion. If handled poorly, these elements can serve as a vicious cycle of underdevelopment and exclusion.

In the Egyptian case discussed earlier, the funding and attention of the Ministry of Education were devoted in disproportional amounts to the four areas. The majority of funding and attention went to physical resources, specifically the purchase of hardware for multimedia centers. A fair amount was also spent on digital resources, though not with any thought or planning as to their appropriateness. A small amount was spent on teacher training, but not in any way that developed educators' underlying skills or knowledge in using new technologies for instruction. And virtually no attention was given to developing means of social or institutional support for teachers' and students' use of technology. For example, low-cost efforts, such as the establishment of e-mail lists or bulletin boards so that teachers could exchange ideas and resources, were ignored, with funding going to high-profile campaigns (e.g., international videoconferences) that had little impact on classroom use of technology.

The Social Embeddedness of Technology

This brings up a second point, which is the *social embeddedness of technology* (Deibert, 1997). In other words, while a digital divide framework suggests that technology "impacts" a social situation, in fact, technology and society are coconstitutive. While technology can help shape social relations, social relations also shape how technology is developed and deployed.

In this case, a fundamental characteristic of the Egyptian educational system, like the Egyptian bureaucracy overall,

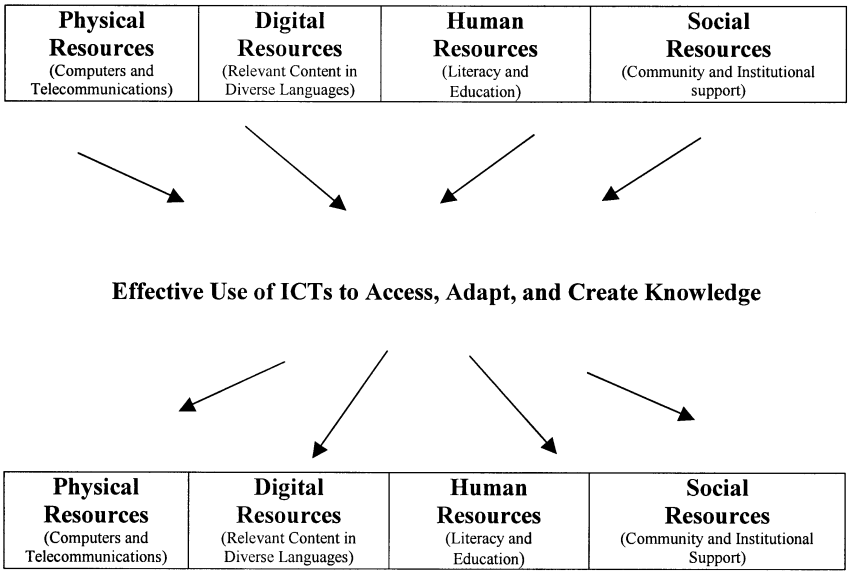

FIG. 1. Resources that enable technology use for social development.

is its steep vertical hierarchy (see discussion in Hudson, 2000). The TDC, like other governmental and MOE departments, is hierarchical to the extreme, with long chains of command, and those at any level but the top are unable to make decisions. Principals, teachers, and students know from experience that they must await orders from above. For example, on one occasion, this researcher made a simple request of a teacher to see a copy of the CD that he uses in school. The request was bounced up one level after the other, with no one lower than the vice-minister of education willing to grant permission. (The vice-minister finally said yes.)

In such an atmosphere, it is not surprising that technology serves a purpose of hierarchy and transmission, rather than of horizontal networking (see discussion of this same issue in U.S. education in Hodas, 1993). Though the MOE and TDC adopt the discourse of interactive education, the spending and support—whether on satellite television, or CDs, or top-down training via videoconferencing—have gone almost entirely to transmission technologies. Thus while the rhetoric of educational technology in Egypt discusses overcoming divides through technology-enhanced educational reform, the existing social structures in Egypt have helped shape a very different use of technology.

Technology and Power

Finally, as Feenberg (1991, 1999) reminds us, the social shaping of technology is intimately tied up with broader issues of class and power. The political context of Egypt reflects a strong carryover from the Nasser period, based on authoritarian rule by a military-backed leadership within a patriotic, nationalist framework (Hinnebusch, 1990). The political role of schooling in this context is to maintain nationalist support for the regime and isolate the government's enemies, who in today's climate are the Islamist fundamentalists. Any reform that reduces the authoritarian hierarchy of the educational system is highly suspect. Engaging in the rhetoric of reform, with showcase technology projects that can be pointed to as evidence of governmental greatness, while avoiding the actual implementation of reforms that could shake up a fundamentally conservative institution, thus serves the government well. For the government to engage in high-visibility technology efforts without meaningful reform is thus not necessarily a contradiction at all, but rather a projection of state control.

In addition, Egypt is a highly stratified country, especially in the area of education, as illustrated by Birdsall and O'Connel's (1999) international comparative study (see Table 1). This is due, in part, to disproportionate spending on university and secondary education, which is inaccessible to the majority of the population, and too little funding to primary education (Birdsall & O'Connel, 1999; Fergany, 1998; Institute of National Planning, 1998). The vast spending on educational technology in the country, which has gone overwhelmingly to secondary schools and universities, rather than primary schools, has worsened this inequity, despite all the grandiose but unrealized plans for reaching the rural poor through distance education. Once again, the ambitious programs serve those in power by creating a veneer of equality and reform without its substance.

TABLE 1
Comparative national inequality in mean years of schooling completed (Gini coefficients circa 1990)

Country	Education inequality
Egypt	.700
Kenya	.600
Jordan	.615
Brazil	.461
Indonesia	.494
Korea	.257
Thailand	.456

Note. From Birdsall and O'Connel (1999).

In summary, the framework of a digital divide obscures these important social, economic, and political factors which frame how technology is used in Egypt. While there are undoubtedly ways that technology could be used to advance the educational opportunities of Egypt's poor, the mere distribution of computers into schools does nothing to make this happen, and could arguably be said to have deepened inequality in Egypt. Similarly, since the technology is rarely used for any meaningful educational purpose, it has also done little to close any international gap between Egypt and the West either.

Solving Egypt's educational problems requires not so much a provision of equipment, but rather a mobilization of social forces to work for an improved and equitable educational system. Technology can play a role in realizing that system if the physical and digital resources are complemented by the development of appropriate human and social resources. Corea (2000) explains well the limitation of top-down solutions based on provision of equipment, and the correspondingly important role of social restructuring. He states that "information technology implementations often create only superficial and transitionary states of flux in organizations," with organizations returning to their ingrained ways of functioning "once the new systems have been absorbed into, or even ingeniously affiliated with, the previous web of calcified inefficiencies" (p. 9). Corea adds:

> Technologies like computer systems belong to the realm of expressive tools of human nature. Rather than foisting such

> technologies haphazardly on people, the long-term nurturing of behaviors intrinsically motivated to engage with such technologies is likely to prove much more synergetic. In other words, it seems critical to engender a systemic tendency towards innovation in social units. . . . [Studies] have pointed out the importance of achieving an "innovating" rather than a "borrowing" strategy of growth as a means to reduce technological disparities and increase the degree of industrialization (Amsden & Hikino, 1993). It is argued that "a real catching up process can only be achieved through acquiring the capacity for participating in the generation and improvement of technologies" (Perez & Soete, 1988, p. 459). (Corea, 2000, p. 9)

Educational technology reform programs that have been more successful, such as one in Chile (Potashnik, 1996), have devoted only a small portion of their attention to purchase and placement of equipment, and have placed much greater emphasis on human and social development through formation of school-community coalitions, implementation of long-term teacher training programs, and promotion of local autonomy for teachers, schools, and districts. By establishing and researching pilot programs, with funding for teaching development and community involvement, it is possible to identify and build support for the use of technology in alternative educational methods and structures that may go counter to traditional approaches and centers of power (Osin, 1998).

CONCLUSION

The *digital divide* term, when it first emerged a decade ago, played a useful role in focusing attention on an important issue. However, continued use of the term today obscures rather than clarifies the interrelationship of technology and social inequality. By implying that a gap can be filled by the provision of equipment, the digital divide concept draws attention away from more complex long-term processes that underlie social development and inclusion. Information and computer technologies can play a critical role in social development if, as Jarboe (2001) advises, we "focus on the transformation, not the technology" (p. 31). In contrast, as the case study presented here suggests, an overemphasis on the mere presence of computers or Internet connections, without a corresponding emphasis on social mobilization and transformation, can squander resources while leaving inequity intact.

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