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The Allures and Illusions of Modernity: Technology and Educational Reform in Egypt

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Abstract

Much of the research to date on educational technology has focused on its implementation in wealthy countries. Yet instructional technology has a special allure in the developing world, where it holds the promise not just of improving schools but also of hastening modernization. This article examines a national educational technology effort in Egypt, illuminating the contradictions between the rhetoric of reform and the reality of school practices. The analysis points to underlying political, cultural, and economic factors that constrain attempts to improve Egyptian schooling with technology.

Educational technology has always been about much more than improving learning. In the eyes of many proponents, it has been about *transforming* learning -- overcoming traditional educational approaches and supplanting them with revolutionary new paradigms of teaching, learning, and schooling. The flashy new machine in the classroom—whether the film projector or the television or the computer—has represented the pinnacle of modernity in the eyes of its supporters, whether from the government, the business sector, or academia.

Larry Cuban (1986) has done an excellent job of chronicling America's 100-year love affair with gleaming new machines in the classroom, from the radio to the computer lab. Each era has experienced the same cycle of bold promises followed by erratic and disappointing diffusion, with the technology eventually finding a small niche on the margins of the educational process. Where education has changed in the process, it has been in the elite schools of the well-to-do that were disposed to reform in the first place (Cuban, 1986; 1993b).

Now the cycle begins again, with the introduction of the computer and the Internet. There has certainly been no shortage of bold claims about how computers will revolutionize the classroom, transforming the teacher from the stereotypic *sage on the stage* to the new and equally stereotypic *guide on the side* (Knapp & Glenn, 1996; Means, 1998; Mehlinger, 1996; Sandholtz, Ringstaff, & Dwyer, 1997; Starr, 1996). Learners will become autonomous and goal-directed, classrooms will become centers of collaborative, critical inquiry, and technology will have finally transformed schools to match the needs of the information society (see, for example, Starr, 1996).

Research to date, however, makes such claims questionable. Most studies show that the use of computers tends to amplify whatever prior approaches and processes were already occurring in classrooms, rather than transform them (e.g., Warschauer, 1999; 2000). For example, a recently completed four-year national US study of "network science" – in which learners from throughout the world collect and share scientific data over the Internet – found that the projects tended to trivialize rather than transform learning, unless they were based on teacher-led practices of scientific inquiry in the individual classrooms (Feldman, Konold, & Coulter, 2000).

In fairness, it is too early to judge the lasting impact of computer and Internet technology in the classroom. Many people believe that the computer and Internet have a more direct relationship to fundamental changes in human communication and cognition (see Harnad, 1991) and the overall organization of the economy and society (see Castells, 1996; 1997; 1998) than did previous technologies such as television or film. Thus even those who have taken a hardheaded and realistic look at computers in the classroom, such as Becker (2000; 1982) believe that under the right conditions it may facilitate educational reform (Becker, 2000). Perhaps the best that can be said about this is that the jury is still out.

Not surprisingly, the discussion to date of educational technology has taken a US- and Euro-centric viewpoint. The penetration of information and communication technologies (ICT) in most of the rest of the world is much lower, whether in the office, the shop floor, or the classroom. With only a small elite having computer access, and the majority of their citizens living on a few dollars a day (United Nations Development Programme, 2000), the developing countries in South Asia, Africa, and Latin America have not yet been able to fill their classrooms with computers and Internet connections.

However, the lack of modern technology does much to heighten its allure in the developing world. There is much discussion of the potential of new technologies to help countries leapfrog out of underdevelopment. Just as Germany and Japan—with their infrastructure destroyed after World War II—used a completely new infrastructure to catch up to or even leap ahead of other capitalist countries in efficiency of production, many believe that the least developed countries can now make use of information and communications technologies to skip over stages of development (see discussion in Singh, 1999). And indeed, it is precisely those countries that have been able to make effective use of information technologies, such as Singapore, Korea, and Taiwan, which have most recently progressed from underdevelopment to the ranks of the wealthier countries. For developing nations, information technology thus holds the allure of allowing rapid entry to modernity.

A number of developing and middle-income countries in Latin America, Asia, and Africa are now beginning to experiment with information technology in the classroom. With the price of computers and telecommunications falling, and schooling in many countries badly needing improvement, developing countries have great incentive to try to integrate new technologies and new approaches (Osin, 1998). To date, though, little research or analysis has been published on why or how developing countries are attempting to make use of technology in schooling, or what the results have been. The few exceptions to date have for the most part been descriptions of model projects supported by international donor agencies (e.g., Calderoni, 1998; Potashnik, 1996). Though these reports have been helpful, they tend to focus on best practices rather than shedding light on actual practices. The lack of broader and more in-depth analysis of educational technology practices in developing countries can unfortunately lead to a situation whereby educators in those countries uncritically mimic the practices (or what they may falsely believe to be the practices) of wealthy countries, without proper regard to local conditions and circumstances, thus worsening rather than solving problems. Such counterproductive approaches are heightened by the fears of being left behind in the information revolution (see discussion in Agre, 1997).

To help overcome this lack of information on educational technology in the developing world, I carried out a three-year qualitative study in Egypt. Though, as in any such study, the findings apply in particular to the situation under investigation, Egypt represents an excellent example of a society poised on the edge between underdevelopment and modernity (see, for example, New and Old: A Survey of Egypt, 1999).

The study focused on the policies and practices of integrating technology in education in governmental K-12 schools, under the leadership of the Egyptian Ministry of Education. The overall unit of analysis for this study is the governmental K-12 educational sector in Egypt. Where relevant, I also consider data from other educational units in Egypt, including K-12 private schools, governmental and private universities, and non-governmental community technology centers. Data sources for the study included the following:

1. *Participant observation*: I engaged in participation-observation continuously for three years, from 1998-2001, while I was involved in a donor-funded educational project in Egypt. During this time, I participated in efforts to plan, implement, and evaluate technology-based interventions in Egyptian schools and inservice and pre-service teacher education programs. My participation included attendance at meetings of Ministry of Education bodies, international donor and implementation agencies, and Egyptian non-governmental organizations, as well as attendance at and participation in in-service and preservice teacher training programs. It also included professional visits to 25 Egyptian primary, preparatory (i.e., middle), and secondary schools located in rural and urban areas throughout the country and to colleges of education in 10 Egyptian universities, and participation in meetings and training sessions among Egyptian educators. I took notes during these visits and sessions and afterwards typed them up in personal and professional reports. Finally, I have participated in various electronic discussion forums of Egyptian educators focused on use of technology in education.
2. *Interviews and focus groups*: I conducted approximately 100 individual interviews with Ministry of Education (MOE) officials, business leaders, representatives of non-governmental organizations, parents, and students. I also organized about ten focus group meetings of six-to-ten K-12 teachers and faculty members at colleges of education to discuss the integration of technology in classrooms and programs. I took notes during these interviews and focus group meetings and typed them in personal and professional reports following the interviews and meetings. The interviews and focus groups were organized within the context of my work in Egypt and addressed issues related to access to technology at educational sites, skill and knowledge level of educators, and goals and objectives of using technology with students and in professional development programs.
3. *Analysis of documents*. I have collected and analyzed a wide array of documents and reports issued by the Egyptian government and MOE, donor agencies, and non-governmental bodies. While the majority of these are in print, they also include electronic documents, such as Websites of MOE bodies and schools.

The study draws on critical approaches to research on infusion of information and communication technologies (Warschauer, 1998). A critical theory of technology (see Feenberg, 1991) distinguishes itself from both *determinist* approaches (which view technology as of necessity having a positive or negative impact) and *instrumental* approaches (which view technology as a

valueless tool which can be deployed toward any end), and critical approaches. (Determinist approaches are alternatively referred to as substantive approaches or autonomous approaches (see, for example, the work of Ellul, 1980). Instrumental approaches are alternatively referred to as neutralist approaches and are often backed by technologists; see discussion in Shallis (1984).) Both determinist and instrumental approaches are seen as downplaying the embeddnesses of social, political, economic, and culture factors in technologies, which shape (but do not determine) how technologies are deployed. In a critical approach, technology is viewed as a site of struggle, and investigations of technology implementation seek to uncover underlying power relations that shape how technology is used, similarly, for example, to how critical literacy studies seek to uncover the underlying power relations framing literacy practices (e.g., Street, 1984; 1993).

In reporting on the study, I will focus on three aspects: (1) the discourses of technology-based educational reform, (2) the practices of educational technology, and (3) the social context of education and technology which helps explain the (mis)match between discourse and practice. First, though, I will briefly introduce some necessary background information on Egypt.

Egypt at the Turn of the Millennium

I decided to conduct this study during my first week in Egypt, as I stood on the banks of the Nile and took in the Cairo landscape. Across the Nile, I saw the glimmering towers of the World Trade Center, including some of the fanciest stores, restaurants, and offices of modern Egypt. Looking down, though, I also saw a poor family of eight who lived in three tiny boats by the bank of the Nile. Thin and poorly clothed, this family apparently spent their days and nights on a couple of tiny canoes no longer than a fishing pole. Yet, as I looked down, I saw a shiny object in the center boat, and, upon looking more closely, I realized it was a battery-operated television. Even this impoverished family living in tiny canoes on a highly-polluted river was grasping at modernization through media. This contrast within contrasts was an excellent introduction to me of Egypt today. Egypt is rushing toward modernization, while at the same time modernization must conform itself to the centuries-old ways of life of Egyptian society.

The use of technology in education in Egypt is situated in a broader social and educational reform movement that dates to the early 1990s. In 1992, the Egyptian government, backed by the World Bank and International Monetary Fund-backed structural adjustment program, launched an ambitious structural adjustment program (Korayem, 1997). The ongoing program seeks to transform the previously stagnant, insular semi-socialist economy inherited from the Nasser era into a modern, transparent, and efficient economy that can compete in a global market (Galal, 1995; Sachs, 1996). The reform process has shown some positive results; Egypt's gross national product grew on an average of 5.4% annually from 1995-2000 (based on data available from the World Bank, available at <http://devdata.worldbank.org/data-query/>), up from an average of 1.5% in 1990-1995 (Galal, 1995). This growth has brought Egypt from the ranks

of the least developed countries up to the lower medium-development countries, ranking at 119 out of 174 countries according to the United Nations Development Programme's Human Development Index, with a gross domestic product of \$3041 per person (GDP is calculated by the UNDP according to *purchasing power parity*, i.e., how many equivalent goods can actually be purchased in a country), an average life expectancy of 66.7 years, and an infant mortality rate of 6.9% (United Nations Development Programme, 2000).

In spite of some areas of improvement, Egypt is still troubled by high rates of poverty, reflected by a low literacy rate and poor public health in urban and rural areas, and the financial structures of the state are far from being fully reformed or stable (Institute of National Planning, 1998; New and old: A survey of Egypt, 1999). The structural adjustment program thus continues with the goal of modernizing the economy, overcoming social exclusion and poverty, and bring Egypt to the economic level of middle-income countries such as Malaysia and eventually to that of newly-industrialized countries such as Korea.

In no other arena is the need for institutional reform and social inclusion greater than in education. 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 & Lesley, 1999). Problems identified include large class sizes, often exceeding 45 students per class in urban schools; 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). These problems are reflected in a \$2 billion private-tutoring industry that is half the size of government expenditures on public education (see discussion in Birdsall & Lesley, 1999). In effect, teachers have a disincentive to teach well, since they earn for more than their governmental salary by tutoring their own students privately to make up for what they failed to learn in school.

The expense and low quality of education have contributed to a high dropout rate in primary school (Fergany, Farmaz, & Wissa, 1996) and a corresponding low rate of adult literacy (53.7% overall and only 41.8% of women, United Nations Development Programme, 2000). They also lead to a low-skill level and employment potential among those who complete school; two studies claim that high school graduates in Egypt who don't go on to university have less earning potential than people who have only partially completed primary school (Bartsch, 1995; Fergany, 1998).

The problems of education in Egypt are systemic and stem from a wide variety of causes, including the poor state of education following the era of British colonial influence, the rapid population growth rate which overwhelms limited resources, and the priorities of the previous Nasserist system which emphasized the quantity of schools rather than their quality (Jarrar & Massialas, 1992). Also of note is the limited demand for education, at least in the past, due to the poor-performing Nasserist economy (Birdsall & Lesley, 1999). With

economic reform and growth major governmental priorities, there is now widespread recognition in Egypt that poor-performing schools are a drag on socio-economic development and that educational change is critical.

ICT in Egypt

The other major contextual factor shaping technology use in education is the general growth and role of information and communication technologies (ICT) in Egypt today. Egypt began emphasizing the adaptation and integration of ICT in the early 1990s. Expansion of ICT is viewed as critical for modernizing production, distribution, and marketing efforts and thus assisting Egypt in competing successfully in the global market (Mintz, 1999). Egyptian government and business leaders also hope that the information technology sector will become an important industry in its own regard, and they often point to India and Israel as models that they would hope to emulate. Egypt has thus placed major emphasis on ICT, and Egypt is reputed to be one of the fastest growing ICT markets in the world. New communications media in Egypt include the Internet, mobile telephony, and digital satellite television.

The Internet. The Internet was first introduced to Egypt in 1993, when a small university network was established (Information technology in Egypt, 1998). Commercial Internet use began three years later and has developed with more government support and less censorship than in many other Mideast countries, reaching a total of some 600,000 Internet users by 2001 (NUA, 2003), representing about 1% of the population. The growth of the Internet in Egypt is constrained by economic factors in a country where per capita income is roughly \$120 per month (World Bank, 2001). This is compounded by the fact that local telephone calls cost \$1-\$3 an hour, making frequent Internet use expensive even for the small middle class. Low teledensity rates – 6% nationally (United Nations Development Programme, 2000) and only 2% in rural areas (Badawi, 2000, July)-- mean that people do not have telephones to log on, and only about 1% of the population own computers (United Nations Development Programme, 2000). The Internet is thus inaccessible to Egypt's poor, and even many in the small middle class must resort to coping mechanisms, such as sharing Internet accounts or using Internet cafés.

Economics is not the only factor restricting access to the Internet. Other major factors are the high illiteracy rate and language usage. The Internet largely arose in Egypt in English-language milieu, including the country's small high-tech and international and foreign business sectors, and to this day common standards of Arabic language computing and communications have not been reached. That means that the vast majority of Web sites and computer-mediated communication is conducted in English (Warschauer, Refaat, & Zohry, 2000). This presents less of a problem for the Egyptian elite, many of who have studied in English medium schools and can thus read and write the language as well as Arabic. However, English is taught very poorly in public schools, so the vast majority of the people do not know it at all.

Wireless telephony. Egypt has also tried to extend its new media through

wireless telephony. The number of lines grew to more than 1 million in four years (El-Nawawy, 2000), thus swamping Internet growth. The higher rate of wireless telephone use compared to Internet use is due to a variety of reasons, including language (telephone communication is done in Arabic), initial investment (a wireless phone is much less expensive than a computer), and the familiarity of phone use. Wireless telephony penetration has reportedly tripled again from 2000 to 2002 to reach three million lines (Arab Communication Consult, 2002), or about five percent of the population.

Satellite television. Finally, the government has invested heavily in the development and launching of two digital television satellites, Nilesat 101 and Nilesat 102, with some 180 stations, as another medium of high-tech communications. Nilesat is designed to serve developmental goals through its emphasis on educational program (see discussion below). Nevertheless, with reception requiring not only a television and satellite, but also a \$400 digital receiver, Nilesat is believed to have very few subscribers to date (Sakr, 1999).

In summary, then though new information and communications media have grown rapidly, they remain accessible only to a few percent of the Egyptian population. The urban and rural poor in most need of access to information and communication resources are excluded from the new media.

It is not surprising that in Egypt, as elsewhere, information and communication technologies are being used principally by those with money. This reflects the natural amplifying affect of the ICT throughout the world: those with financial, human, and social capital have better access to ICT, which they can use to further enhance their financial, human, and social capital. And indeed, no matter how well motivated the Egyptian government or private sector were, there is no way they could instantaneously put computer, Internet connections, mobile telephones, and satellite televisions in the homes of Egyptians poor.

Nevertheless, at an institutional level, governments can deploy ICT to serve broader developmental goals. In Egypt, the main sector in which Egypt has attempted to deploy ICT for broader development purposes is education. The discourses of technology-based educational reform, and their practices, will now be discussed.

Discourses of Technology-Based Reform

The Government of Egypt believes that it has found a perfect combination in technology and educational reform. It has an ambitious and expensive plan to use ICT to help overcome the country's educational problems while simultaneously preparing a technologically-skilled workforce to meet the demands of the 21st century.

The Ministry of Education (MOE) initiated its national plan for the technological development of education in 1994. A special unit within the MOE, called the Technology Development Center (TDC) was formed shortly thereafter to coordinate the MOE's effort to infuse technology into schools.

The goals of the national technology in education plan have been laid out in a number of publications issued by in the name of the TDC (e.g., Technology Development Center, 1997), the MOE (e.g., Ministry of Education, 1999), and the Minister of Education, Dr. Hussein Kamel Bahaa El Din (e.g., Bahaa El Din, 1997). These publications adopt the rhetoric of globalization, modernization, and reform, with a focus on three areas. First, there is the discourse of *technology-based economic competition*: As noted by the TDC (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 too late (p. 79).

The TDC goes on to explain that only through the infusion of modern technology in schools can this economic challenge be met.

Following on the heels of economic competition is the discourse of *educational transformation*. As Bahaa El Din (1997) writes,

This emphasis [on technology] will have a transformative effect on education....The information explosion has changed education from a mode of memorization of a certain amount of knowledge to one in which students are expected to research and apply the knowledge they acquire to various life situations. Education will change from one that focuses on memorization to one that focuses on research, analysis, identification of relationships in the data, and potential application.

A sub-component of the discourse of educational transformation is that of autonomous learning. In MOE publications, multimedia laboratories, compact discs, the Internet, videoconference fiber optic networks, virtual reality, and electronic libraries will all provide learning resources so that students can engage in learner-centered experimentation, experiential learning, and critical thinking (Bahaa El Din, 1997; Technology Development Center, 1997).

Finally, the technology plans also emphasize equal opportunity for all. Distance education efforts, backed by the deployment of mobile technology caravans, are intended to bring educational resources to underserved students and thus bolster basic education and literacy (Technology Development Center, 1997).

The Government of Egypt (GOE) and MOE have assembled an impressive array of resources toward meeting these goals, including more than 600 full-time staff working for the TDC. The major technology projects involve computers and the Internet, satellite television, and video conferencing.

Computers and Internet: The TDC has placed multimedia rooms in all secondary and preparatory (i.e., middle) schools in Egypt and many primary schools. These rooms have 2-3 high-end computers, LCD devices for projecting from a computer to a screen, collections of educational software, and access to the Internet. These rooms are to be resources areas for teachers who can bring in their classes on a sign-up basis. Much of the school curriculum has been transferred to CD format for use in these multimedia rooms.

In addition to the multimedia rooms, secondary schools also have computer laboratories with 10-15 DOS or Windows computers. These courses are used for teaching an elective subject course called “computing” which is designed to cover basic operation and programming skills.

Satellite Television: Ten of the Nilesat television stations have been dedicated to educational program. Ministry of Education staff are creating educational television programs for seven of these stations based on the national curriculum. (The other three stations have been dedicated to the Ministry of Higher Education). Televisions, satellites, and digital receivers have been installed in the above-mentioned multimedia rooms in approximately ten thousand schools to facilitate access to the programming.

Videoconferencing Facilities: A national multipoint videoconference facility has been established, with videoconference training centers of 100-200 seats in each of Egypt’s 27 governorates. The facilities are principally used for national teacher training programs and for national communications between Ministry of Education staff. The facilities allow participants in these programs to project from any site to all the other sites.

Practices of Educational Technology

The funds spent on information and communication technology represent a major investment for a developing country. What then are the results of this investment, and how do they match the MOE’s lofty goals for technology in education? Unfortunately, results to date are unsatisfactory in all areas. Technology has been thrust on top of a mostly dysfunctional system, rather than used to help transform that system. The Technology Development Center itself is an add-on to the Ministry of Education that grabs up a huge portion of Ministry resources but appears to coordinate 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 each of the three program areas:

Computers and Internet

The computers in the multimedia rooms, with 2-3 computers per school, seem to be spread too thin to make any difference. In any case, the rooms are often 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 I inspected the use logs, it was clear that many of the multimedia rooms in the schools I visited are rarely used outside of these formal visits. This phenomenon has frequently been reported often in the press. As one article (PCs and teachers omitted from new computer science 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 his own school, "And the good people know only how to unplug and cover it to protect the computer from dust so as not to be damaged."

During my visits to schools, when students did use these multimedia rooms, they usually sat and watched 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 told me that they were warned 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, told me that they are not allowed to depart from the prepared curriculum, nor are they prepared to do so 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 generally forbidden to be used for anything other than the specified computer literacy courses, at least in the schools that I visited.

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, in the schools that I visited, only the official in charge of the multimedia room was given the Internet account information, and neither classroom teachers nor students were allowed to access the Internet independently.

Satellite Television

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, educational programming on satellite television appears to be rarely viewed, since relatively few people have 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.

Interactive Videoconferencing

The videoconference centers are used for teacher training, but the trainings that I have observed and heard about were more 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 generally 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 widely known and are reported frequently in the press (e.g., PCs and teachers omitted from new computer science curriculum, 2000). The ill-suited expenditures on technology—with the emphasis on hardware and software and inattention to promoting effective use of technology by skilled practitioners--serve to deepen public cynicism for the government and the Ministry of Education.

Educational Reform?

How then do these efforts stack up against Egypt’s developmental goals of modernization, educational reform, and social inclusion? Though modernization and reform are the *raison d’être* of using technology in schools, the funds spent on technology have not served that purpose. Basic steps, such as using e-mail networks to facilitate coordination among teachers, have been ignored, in favor of high-profile but ill-suited expenditures. The Ministry rushes from one high-tech scheme to another, in recent years, rushing to transfer content to CD-ROMs, digital satellite television programs, and streaming video. In all cases, the content remains more or less the same, and the instruction is top-down, without engaging the type of interaction and inquiry among teachers and learners that the Ministry itself says is necessary for educational improvement

(see, for example, Bahaa El Din 1997). The same top-down hierarchy permeates the TDC as other sections of the Ministry, giving classroom teachers—let alone students—little opportunity to exercise independent initiative.

In short, the curriculum, the exams, the teaching methods, and the need for expensive private tutoring have all remained the same. On a few occasions, ICT provides an alternate delivery mechanism, but the methods and content and approach to education have not substantially changed. ICT has not appeared to contribute in any meaningful way to reform and modernization of education.

There is also concern that ICT expenditures could be deepening social inequality. A major hindrance to Egypt's development is its unequal education system, and the resulting poor human capital development among the urban and rural poor, especially rural girls. The high rate of illiteracy in Egypt, especially among girls, is a major brake on development. Economists and development specialists believe that Egypt's educational expenditures are skewed to the well-off, and that Egypt spends an insufficient amount of its overall education pie on basic education and literacy promotion (Birdsall & Lesley, 1999; Institute of National Planning, 1998)

Not surprisingly, the investments in ICT have done little to overcome this bias and have likely worsened it. Egypt's investment in ICT, as in other countries, goes to those sectors best able to absorb it. When Egypt needs to be investing more in rural, primary education, ICT spending is skewed toward universities and secondary schools, which are located disproportionately in urban areas. With a mean years of schooling rate of 5.0 years (Fergany, 1998), much of the population never reaches the secondary schools that are absorbing the technological resources. A new effort to provide computers to university students at below-market prices is laudable on paper but will also put computing resources in the hands of those who can most afford them on their own. The expensive videoconferencing centers are based in governmental capital cities and draw money away from other types of school-based teacher training programs that could be spread more equitably around the country. In sum, the vast majority of spending on ICT is apparently going toward secondary and higher urban education, rather than toward improved primary rural education that could help combat illiteracy in Egypt.

In addition, an emphasis on ICT in education has tended to privilege the use of English over Arabic. Whereas textbooks available in Egyptian schools are all available in Arabic, much computing in Egypt takes place in English – due to English language computer science terms, English operating systems, English resources on the Internet, etc. (Warschauer et al., 2002). An increased emphasis on English—including the introduction of English in primary schools—has thus far borne little fruit (due to a lack of trained teachers, overcrowded classrooms, etc.), but has disadvantaged those students in rural primary schools who now have less time and opportunity to work toward gaining literacy in Arabic.

The Social Context of Educational Reform and Technology

It is not surprising that Egypt's educational technology effort has fallen short of its goals. Countries such as the United States, that have been spending a great deal more money on educational computing for a much longer period of time, are still far from getting it right. The learning curve for intelligent use of technology is a long and steep one, and there is no reason to expect Egypt to outperform other countries in this regard.

However, it is worth analyzing the Egyptian case in more detail to interpret the social context of educational technology difficulties. This may shed light on the broader issue mentioned at the beginning of this article as to whether the infusion of technology constitutes a lever for reform.

I believe the evidence of this study strongly supports the socialization view articulated by Cuban (1986; 1993a; 1993b) and others (e.g., Spindler, 1974) that gives priority emphasis to the broader social shaping role of schools. According to this view, deeply-held cultural beliefs about the nature of knowledge, how teaching should occur, and how children should learn steer policymakers and teachers toward certain forms of instruction, and that these forms of instruction are guided by the broader role of the schools to "inculcate into children the prevailing social norms, values, and behaviors that will prepare them for economic, social, and political participation in the larger culture" (Cuban 1993, p. 249). From this perspective, educational reform is not impossible, but tends to be available most often to the more privileged strata of society. Reforms affecting the masses are usually carried out in fringe ways, without disrupting the overall socialization function of the schools.

In this regard, it is useful to explore the broader social context that frames education in Egypt, and see how this framework constrains educational reform with computers. Three aspects will be examined: the *political*, the *cultural*, and the *economic*.

The Politics of School Reform

The political context of Egypt reflects a strong carry-over from the Nasser period, based on authoritarian rule by a military-backed leadership within a patriotic, nationalist framework (Hinnebusch, 1990). Egyptians enjoy neither freedom of speech, nor freedom of organization, nor freedom of organization and protest. Strikes and demonstrations are disallowed, those expressing contrary political or religious views are jailed, and formation of political parties and non-governmental organizations is restricted (The Economist Intelligence Unit, 1998-99). The current president, Hosni Mubarak, has been in power since 1981, and the country has been under Emergency Law during the entire time of his rule.

What then is the political role of schooling in Egypt, dating back to the Nasser regime? It is largely to forge a national identity based on mass access to (formally) equal schooling (see Jarrar & Massialas, 1992 for a history of Egypt's

educational policies). Nasser brought huge numbers of children into the Egyptian school system, and construction of new schools continues to be a major priority of the current government (and deservedly so). However, dating back to the days of Nasser, any reform which allowed differences to emerge in schools, or which lessened the authoritarian hierarchy of the educational system, was highly suspect.

Today's political leaders, like Nasser, see schooling largely from the view of social control. Though the Islamist fundamentalist movement in Egypt is under greater control than it was in the 1990s, Islamist opposition remains a threat to the government, just as it has for the last 50 years (and, indeed, may grow due to public frustration with regional political events). In such a climate, a main function of schooling in Egypt, in the eyes of the regime, is to foster pro-government sentiment and to isolate the Egyptian fundamentalists. Toward this end, the *appearance* of modernization has proven very attractive. By constantly emphasizing how many computers it has put in schools and how advanced its videoconference system is, the government goes on the offensive to show that it represents the future and that it can compete with the wealthiest countries in the world. However, to actually *use* this equipment to reshape schooling would pose too much of a threat to a fundamentally conservative institution. So the system – beyond the wishes and desires of any particular individual – supports a rhetoric of reform without its substance. This is not due to the conspiracy of an elite, but rather due to the institutional reproduction of an educational and social system similar to that which occurs throughout the world.

The Culture of School Reform

For a variety of historical, political, social, economic, and religious reasons, a culture of vertical hierarchy permeates Egypt and the Arab world. Information is meant to be hoarded, decisions are made at the top, and rulers maintain power through a complex balance of power techniques. This hierarchical system, which de Atkine (2000) found to be evident in the Egyptian military, also pervades other social systems in the country (see discussion in Hudson, 2000). And indeed, an almost militaristic like atmosphere pervades the Ministry of Education, especially as it affects the use of technology. All three top leaders of the Technology Development Center are former military generals (none, by the way, with a background in education), and former corporals, lieutenants, and other officers are found below them. Computers are found on none of their desks, except as monitoring devices, i.e., to observe educational videoconferencing sessions organized within the Ministry. 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 unable to make decisions. For example, on one occasion, I 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 US 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 – has gone almost entirely to transmission technologies.

The Economics of School Reform

Egypt, like many developing countries, is highly stratified, yet that stratification is expressed in a special way. Due to the land reforms and other programs of the Nasser regime, *income inequality* and *land inequality* are relatively low. Education inequality, however, is quite high, even when compared to other developing countries. Data gathered by Birdsall and O'Connell (1999) illustrates this point (see table 1).

Table 1. Sources of Inequality Across Countries (Gini coefficients c. 1990)

Country	Income Inequality	Education Inequality	Land Inequality
Egypt	.320	.700	.480
Kenya	.544	.600	.746
Jordan	.407	.615	.686
Brazil	.596	.461	.852
Indonesia	.317	.494	.556
Korea	.336	.257	.351
Thailand	.515	.456	.366

Source: Birdsall and O'Connell, 1999

In other words, control of education—much more so than in other countries—is a principle means by which the well-to-do in Egypt defend their privileged social status. And the social status achieved through education means a great deal in Egypt. It allows people to join the highest paying and most prestigious professions, it is a de facto requirement for setting up your own business, and it is a prerequisite for marriage within the elite and thus enjoying the financial and social benefits showered on family members by the Egyptian upper class.

The defense of social status through elite education takes place through several means. First, a disproportionate share of funding goes to university education as opposed to K-12 education (Birdsall & Lesley, 1999; Fergany, 1998; Institute of National Planning, 1998). Secondly, socioeconomic privilege is reserved for those who complete the university; as mentioned earlier, those who graduate

secondary school without a university education are actually worse off economically than primary school drop-outs unless they choose to work outside Egypt (Bartsch, 1995). Third, access to universities – and to the most elite departments or programs within the universities – is based on a set of decontextualized school-leaving exams that the wealthy have been preparing for all their lives, through their better private schools and their expensive private tutoring.

This class bias that permeates Egypt's educational system makes school reform extremely difficult to achieve. The Ministry of Education has attempted to disrupt the testing and private tutoring system for years, but has been continually rebuffed by a powerful elite who have invested huge sums in preparing their children to pass the exams and gain access to the elite (see Sarhaddi Nelson, 2001) and who thus have little interest in seeing such a system overturned.

This economic elite who exercise a powerful influence over Egyptian politics have little interest in technology-based school reform in governmental schools. Their children are already becoming computer-proficient at home, and for them the schools serve as little more than a sorting system to maintain their class privilege.

Meanwhile the poor have little vested interest in demanding computers in the schools. The struggle of the poor is for decent basic education that will allow their children to read and write and compete fairly in society. With class sizes of upwards of 60 in the poor neighborhoods of Cairo, and many urban and rural schools lacking basic amenities, the poor have other priorities than computers and the Internet in schools, which are widely viewed as a boondoggle. There is thus no constituency that is fighting hard to reform schools through infusions of technology.

In summary then, there are powerful political, cultural, and economic factors motivating the current structure of education in Egypt. Large-scale spending on information technology has had little if any impact on changing these factors, and it is unrealistic to expect that it will. The emphasis on the façade of reform without any substantial changes is evident throughout the educational system. The Ministry began teaching English in elementary school in order to emphasize modernization and ties to the West, but this instruction has almost no value because the majority of those designated to teach English in primary school know little of the language itself. (Indeed, a committee of Egyptian applied linguistics, several with expertise in the field of English language teaching, recommended against the change to earlier English language education.) The Ministry, at huge expense and often with the support of donor funding, also sends thousands of teachers per year to the United States and Britain to expose them to Western environments and approaches, but makes it difficult for these same teachers to implement any substantial changes when they return (Warschauer, 2003b). In other words, whether in English teaching, teacher training, or use of technology, a higher priority is put on creating the illusion of modernization rather than on actually modernizing practices.

Finally, though beyond the scope of this particular work, the role of donor agencies must also be briefly mentioned. For example, the United States Agency for International Development has long made Egypt one of its largest recipients, principally for global political reasons (Weinbaum, 1986). In too many cases, the US and other donors have poured money into expensive infrastructure projects in Egypt, including those related to technology in education, without paying sufficient attention to how technology might actually be best used in local contexts (see discussion in Warschauer, 2003a, 2003b).

Conclusion

While the large gap between rhetoric and reality of technology-based educational reform in Egypt stems in part from poor planning, it is also the logical outcome of powerful socioeconomic factors that shape educational policy and practice in Egypt. Though Egyptian officials voice the discourses of reform popularized in the West, it is unlikely that they will be widely practiced in Egypt (and, indeed, it is questionable how often they are actually practiced in Western countries.) Egypt would do better to draw on its own social norms in designing educational reform policies. Holliday (1992; 1994) has demonstrated that the best classroom instruction in Egypt is teacher-centered, reflecting the social and cultural realities of Egypt rather than the learner-centered environment favored in US graduate schools of education; most Egyptians believe that their educators should organize “teaching spectacles” featuring top-down instruction rather than “learning festivals” based on collaborative project-work (Holliday, 1994, p. 36). If and when educational technology begins to make positive headway in Egypt, it will be in a way that is likely very different than a Western-based discourse might suggest. Indeed, the US has its own share of educational problems, and many countries with traditions of teacher-centered education, such as Korea, Singapore, and Taiwan, have shown great success in raising the educational level of their students.

As for the more general conclusion, this study provides support for the work of Cuban and others who emphasize the limited impact of machines in reforming education. In Egypt, as in the US, technology can play a role in remaking education only if and when broader social, political, cultural, and economic factors are aligned to make school reform likely. This does not suggest a fatalistic approach that denies human agency, but it does imply that technology is something other than a neutral tool that can be deployed toward any ends. It is better to think of information and communication technologies as “socio-technical networks” (Kling, 2000, p. 3) that involve complex social relationships and contexts.

In other words, those who seek to reshape schools, whether in Egypt, the US, or elsewhere, need to think about not only the technology of the classroom, but also the technology of informational capitalism. Globalization, post-Fordism industrial relations, and the advent of new communications media are changing the context of education in the US, other Western countries, and, increasingly, in the developing world. These broader economic shifts may well introduce a greater demand for a more educated (or differently-educated) workforce in

Egypt, and there are already signs that the business community in Egypt is starting to throw its weight toward educational reform for just this reason. Modernization of the educational system in Egypt, as elsewhere, will come about because influential social forces push for it, not because x number of computers have been put in y number of schools. Changes in the political economy can result in a context that better supports reform, but even then reform will not happen on its own. Working for educational reform requires not *machines* but rather *mobilization*—that is, the engagement of social actors to press for change, taking into account the relevant political, economic, and cultural contexts that help shape classroom learning and teaching.

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