USING ICT IN ODL FOR CURBING NEO-ELITISM AND BUILDING HUMAN INFRASTRUCTURE

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INTRODUCTION

As much as there is hope that the emerging technologies will lead us to healthier lives, greater social freedoms, increased knowledge and more productive livelihoods, there is despair that these very technologies deepen the information/knowledge gap among countries and societies within them. While there is a huge enthusiasm to be part of the network age, characterized by the technological revolutions and globalization that are increasingly integrating markets and connecting people across all traditionally known barriers, there is also great fear about its implications for developing countries. That the globalization-induced and trade-oriented Intellectual Property Rights (IPR) regime considers knowledge a commodity, as opposed to a public good, is but one example that legitimizes the fear. But, are there ways to bridge the savage cleavage between hope and despair, and between confidence and fear? However paradoxical it may sound, only technology can provide a solution to the problem it creates. Instead of getting overwhelmed by the giant technology strides made in the North and the concomitantly increasing imbalances, it is important for the South, housing most of the world's population, to firm up its public policies focusing on human development, a manifestation of which is, among others, wider educational access and better public health. A pro-poor slant in public policies will help ensure national economic growth that can efficiently address the issue of market-driven technology innovations. A strong political will combined with robust policies encompassing education and information and communications technology (ICT) will help accelerate the efforts of the developing countries to equip themselves to defy the challenges of the network age, and this is the basic premise of this paper.

In order to put the discussion in perspective, this paper begins with an overview of what human development entails and touches upon how it is inextricably linked to technological innovations. Acknowledging the reality of digital exclusion, the paper then observes that technology is the effect of, and not merely the cause for, human development. Looking at the open learning situation against the technology-driven scenario, this paper holds the view that it is not so much the extent of the use of ICT that divides people as the purpose for which and the resourcefulness with which it is used. The paper further postulates that the ICT-mediated/enabled open and distance learning (ODL) will curb the technology-induced educational elitism, i.e., neo-elitism, and, in so doing, help contribute to human development.

HUMAN DEVELOPMENT MATTERS

That people are the real wealth of nations and that the investments made on them in terms of education determines the health of nations is not an exaggeration, and this way of looking at development is not entirely new either. However, this realization has never been so conspicuous as it is in the present knowledge society – a society in which knowledge/information and creativity are held supreme to, for example, the natural resources it may have been endowed with. Transcending national income grids, the focus of development, therefore, ought to be on people, their education, health and their participation in decision-making. Looked at from this viewpoint, the challenges of human development particularly in the developing economies remain formidable.

One estimate, for example, shows that a little more than a half of the 4.6 billion people in the developing countries lack access to basic sanitation, nearly a billion lack access to potable water resources, 34 million live with HIV/AIDS (Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome) and more than 30,000 children under age five die each day from preventable causes. On the education front, about 1 billion are illiterates, nearly 60% of whom are women, and 325 million boys and girls are out of school. As a consequence, about 1.2 billion people live on less

than US$1 a day and 2.8 billion less than US$2 a day. This scenario is disturbing, to say the least. More so, when we consider that the present status ironically represents the growth the developing world has registered in the past three decades. For example, it is reported that a child born today can expect to live eight years longer than one born 30 years ago, the adult literacy has increased from an estimated 47% in 1970 to 73% in 1999 and the share of rural families with access to safe water has grown more than five-fold. This leaves one wondering whether this is growth or plain consolation. Though the standard of living in developed countries is not so pathetic as that in the developing ones, in the OECD (Organization for Economic Cooperation and Development) countries, about 15% of adults lack functional literacy, 8 million are undernourished and 1.5 million live with HIV/AIDS. Obviously, in spite of the fact that the course of human development has never been steady, some qualitative changes in the lives of this deprived lot among us, more than mere statistics or quantification, are in order and ought to be effected. One way of achieving this is through technology.

Instances, in fact, reveal that technology has been and is playing a critical role in bettering our lives, and no country is so naïve as to be against innovations in technology. We know that vaccines for HIV, low-cost computers, wireless connectivity, touch screen options for the differently-abled and illiterates, introduction of virus-resistant crops, etc., are being developed. We also know that technological innovations in agriculture, communications, energy, manufacturing and medicine, for example, have been and continue to be the key factors behind human development. Vaccines for infectious diseases, clean energy sources for cooking, Internet access to information and communication, etc., are some of the several technology-spurred developments that directly help improve our health, nutrition, knowledge, living standards as well as increase our ability to participate more actively in the social, economic and political life of the community in which we live. Innovations also generally contribute to increased quality, production and consumption of products and services at affordable prices, notwithstanding exceptions.

To cite an example, while creating newer and faster ways of generating, processing, storing, disseminating and accessing enormous amounts of information, innovations in ICT do simultaneously reduce the costs of these activities and increase their quality. “In 2001more information can be sent over a single cable in a second than in 1997 was sent over the entire Internet in a month. The cost of transmitting a trillion bits of information from Boston to Los Angeles has fallen from $150,000 in 1970 to 12 cents today. A three-minute phone call from New York to London that in 1930 cost more than $300 (in today’s prices) costs less than 20 cents today. E-mailing a 40-page document from Chile to Kenya costs less than 10 cents, faxing it about $10, sending it by courier $50” (World Human Development Report 2001). Furthermore, technology impacts on national economic growth through the productivity-gains it generates. To be precise, the higher is the human development the more are the technological innovations and the vice versa. In other words, technology influences and is influenced by human development.

True that today’s technological transformations have tremendous potential to help accelerate human development and offer novel ways of overcoming traditional constraints. Nonetheless, it is also equally true that technologies designed for the affluent economies need not have to necessarily address the needs of the developing countries, due to their fundamentally different socio-economic milieu. Factors such as income poverty, weak social institutions, unreliable infrastructures and low literacy and skill levels coupled with increasing commodification of public goods, global market-driven pricing strategies, etc., maintain or widen the technology gap. By implication, technologies need to be tailored, or even reinvented, to suit the local contexts and needs, and that obviously takes resources. Developing countries, therefore, must realize that:

- global marketplace alone is inadequate to supply technologies for development. Today’s technological impacts depend primarily on how poised each country is to unlock the potential and creativity of its people, enabling them to come to grips with technology and encouraging them to innovate and adapt it to meet their own needs. It is, therefore, incumbent on individual countries to strengthen its R&D (research and development) capabilities. What the situation requires currently of the developing countries is that they build domestic capacity to identify and use appropriate technology.

- robust policies must be drawn to create a technology-conducive atmosphere, which can arrest the fallout of unfair implementation of global trade, lack of global institutional support, etc. Added to this is brain drain. We aware that developed economies have been attracting developing country professionals – at a high cost to the home countries. For instance, the World Human Development Report 2001 observes that about 100, 000 Indian professionals each year, primarily in the computer industry, accept the United States visas, while the average total costs to India of providing university education to one of these professionals is about US$ 15,000-20,000. This means India is losing as much as US$ 2 billion a year in resources as a result of this emigration to the United States. In addition, technology rules endorsed by countries – either on their own volition or after being coerced – have brought tighter intellectual property protection worldwide. These raise the market value of technology, increasing the incentives to invest in R&D. It is projected, for example, that global spending on ICT will grow from $2.2 trillion in 1999 to $3 trillion by 2003. As much as this creates many niche opportunities for service providers in developing countries, expands user base and cuts down

costs, this can also potentially transform the Internet to a pay-per-view medium. For most developing countries, this means enacting local IT policies, keeping in view global trends and building on reforms that emphasize openness to new ideas, products and investments.

Over the past few decades, the prevailing international policies on technology transfer have placed formidable obstacles in the process of reducing North-South technology gaps; the present discussion on the technology-gap provides no convincing evidence that the technology owners will change their attitudes and policies towards the international transfer of technology. There is no indication that current restrictive business practices, constraints on the ownership of knowledge, and rules on intellectual property rights that are adverse to developing country interests are radically changing, and there are no realistic prospects that the relations between technology-endowed and technology-famished countries will change in the near future. In fact, the politics of world communication represents a historical shift from a public service orientation to private competition with a predominantly commercial focus.

In the main, the relationship between human development and technological advances is one that is mutually conducive, organic and symbiotic. However, the uneven diffusion of information and communications technology – the digital divide – in terms of availability, accessibility and affordability of equipment and services as well as the mastery of technical and managerial skills between affluent and developing countries, and among societies within them, is growing throughout the world rather than diminishing (UNESCO World Communication Report, 1999-2000). This is a veritable cause for concern and appropriate action.

DIGITAL RULES

There have long been huge disparities among and within countries, and the uneven diffusion of technology is nothing new. Electricity, for example, has not yet reached some 2 billion people, a third of the world's population. In 1998, the average electricity consumption in South Asia and Sub-Saharan Africa was less than one-tenth that in OECD countries, an indication how less than 20% of the world's population consumes more than 80% of its resources and also causes environmental and ecological disasters. In addition, the telephone has been around for more than a hundred years. But, while there is more than 1 mainline connection for every 2 people in OECD countries, there is just 1 for every 15 in developing countries. Accordingly, for example, the Sub-Saharan Africa housing nearly 10% of the world's population has only one-tenth of 1% of global Internet connections. The UNDP's Annual Report (2001) gives the following region-wise statistics pertaining to the percentage of population of Internet users:

United States	54.3
High income OECD (excluding US)	28.2
Eastern Europe and CIS	3.9
Latin America & the Caribbean	3.2
East Asia & the Pacific	2.3
Arabic States	0.6
Sub-Saharan Africa	0.4
South Asia	0.4

Piqued as it is by digital divide, during the 1980s, in the wake of the developments in ICT and their impact on industrial performance and economic productivity in the industrialized nations, the developing countries were concerned also about potential social risks, such as technology imperialism or cultural colonialism, replacement of jobs by machines, erosion of individual privacy and national sovereignty. Since the 1990s, however, the concern has been characterized more by a very strong fear of being left behind and cut off from the emerging global digital highway system, as it has emerged that without adequate access to ICT, countries cannot hope to be economically competitive in world trade.

Examples abound to showcase the upside of digital ICT. For example, ICT ensures connections with the electronic networks for trade, finance, transport and science, and helps widen the reach of educational facilitates by making possible distributed learning and providing online library and database access. Electronic networking is also being increasingly used to improve the quality of health services. Digital technologies for remote resource sensing can provide early warning to areas vulnerable to natural calamities, identify land suitable for crop cultivation, identify areas for fish harvesting, etc. Furthermore, desktop publishing, combined with communications technologies, has created opportunities for dissemination of messages across the globe with relative ease and at minimal expense.

Computer technology can also contribute to the development of flexible, decentralized and small-scale industrial production. Thus the competitive position of local manufacturing and service industries can be improved. Serendipitously, this has positive effect on the environment as well. In its report, the World Commission on Environment and Development, for example, suggests that "new technologies in communication, information and process control allow the establishment of small-scale, decentralized, widely dispersed industries, thus reducing the levels of pollution and other impacts on the local environment" (Our Common Future, 1987). Paradoxically, however,

there is also fear that the possible proliferation of digital technologies may result in the use of ICT in environmentally unsustainable ways. That is to say, an extensive use of ICT would mean more production of computers and accessories leading to an increase in the emission of carbon dioxide, toxic wastes such as cadmium (in the batteries), lead (in the screens), etc., as also an increase in resources consumption. The production of a single PC, it is estimated, requires approximately as much energy as the average electricity consumption of a European household per year. One PC requires 20 tons of natural resources, but after three to four years, once the equipment is obsolete, it is dumped on the growing heap of electronic scrap, creating problems for solid waste management. In the light of a rapidly growing world population, which could by the mid 21st century amount to some 12 billion people, the gravity of the situation should be appreciated.

What this illustrates is the fact that the overall picture of digital ICT is presently characterized by contradictions in that as much as a restricting force, it is a liberating force. Building on the enabling aspect of digital ICT is the only way to remove the contradictions, but in order to effect that; such factors as the following that presently contribute to deepen the digital divide are to be dealt with:

- **Finance**: The costs to provide universal access to basic ICT equipment and services need to include basic infrastructural investment costs and recurrent service charges. The annual costs for all developing countries for adding 1000 million telephone lines, subsidizing over 600 million households that cannot afford basic telephone charges, providing PCs and access to the Internet for schools over a period of 10 years could represent from $ 80,000 to $ 100, 000 million. This is not, however, a prohibitive level of funding. It represents about 11% of the world's annual military expenditure, about 22% of total annual spending on narcotic drugs and is comparable with the annual expenditure on alcoholic drinks in Europe alone. Creating adequate access to ICT resources worldwide should not be a problem in a world economy with income amounting to roughly $22 trillion. The core issue is that expenditures for development assistance represent only $ 55,000 million and thus a mere 0.25% of this income (UNDP, 1998).

- **Illiteracy**: As ICT skills are linked almost completely to literacy; the illiterate population is and will be facing social exclusion. This situation particularly affects women since around the world (with a possible exception of the Commonwealth Caribbean), illiteracy rates for women are higher than for men. Without yielding to the temptation of markets, ICT devices based on sound, touch, images or symbols which do not require literacy could and should be developed, while developing countries must make educational provisions broad based.

- **Globalization and IPR regime:** Since today's globalization process is largely determined by Northern market forces, "many developing countries do not obtain a fair share of the benefits of globalization, and some actually suffer net losses" (Khor, 1995). The emerging global regime for IPR, furthermore, tends to give more emphasis to the economic aspects of IPR protection than to public interest considerations, giving priority to the interests of large producers over those of small creators and consumers. Considering knowledge as a commodity and as a private property – not a public good – is detrimental to human development for the ICT poor countries. The North is in control not only due to strength but also because of lack of coordination in the South. "Without policy coordination, Southern countries will stand to lose out in the formulation of international policy frameworks that will have important impact on their national policies" (ibid.).

In addition, it is important to recognize that technology transfer is one thing, but sustainability is quite another. In other words, financial obstacles are indeed a concern, but not the only concern. The transfer of ICT raises questions about their appropriateness in, and the capacity of, the recipient countries to make the best use of them. The challenge of sustainability involves financial, institutional and technical considerations. For example:

- When foreign investments have facilitated the growth of national networks, can they be maintained, upgraded and renovated through the independent generation of funds?

- Will sufficient financial resources and training be invested in developing adequate management and technological skills to secure the longer-term local control over ICT-projects?

Thus, both the developed and developing economies contribute to digital divide, the former by skewed trade policies and the latter by weak political will. As long as populist ideas and slogans to secure vote banks gain currency and priority over human and therefore national development in the developing countries – in the process making them susceptible to international 'arm-twisting' – the currently prevailing lopsided ICT situation will continue for years to come and the world will remain divided. Put differently, the developing countries ought to reprioritize their public policies in such a way to generously invest in infrastructure and people in terms of basic, secondary and tertiary as well as continuing professional education.

This is essential because globalization and rapid technological changes also have made knowledge a critical determinant of competitiveness in the world economy. However, the knowledge revolution also brings with it the threat of widening gap between developed and developing countries with disparities in access to knowledge and information, reinforcing existing differences in capital and other resources. In this dynamic context, the acquisition, creation, adaptation and dissemination of knowledge need to be explicitly built into a country's overall development strategy by:

- updating the economic incentives to compete in capital and labour markets and participate in the knowledge revolution;
- putting in place a human infrastructure – the knowledge and education networks and the learning communities;
- establishing a dynamic national information infrastructure;
- creating national innovation systems through which locals can acquire global knowledge, create and adapt knowledge appropriate to local circumstances, and disseminate it to those who need it (World Bank, 1999).

What our discussion so far reveals is that nothing can be more important as developing the required human resources, as the economic survival of a country depends solely on the quality of the human product. Investment in human capital accrues over many times, though incrementally, in the years to come. To move from the status of developing to that of developed economies, countries have to pay attention to the question of education. This is more so now in the network age that is characterized by information explosion and technological innovations than ever before. Concomitantly, the workforce has to be tuned to accept the challenges, most of which may not be still clear. In other words, it is not just enough for countries to have a workforce that is able to adapt to the present changes in the work demands. They also need to have a proactive and learning workforce that will be able to predict future challenges and put suitable mechanisms in place to effectively face them. However, the mismatch between education and job domains remains in most of the developing economies. In other words, the problem of 'educated' unemployment and uneducated employment is not uncommon and this, coupled with the growing digital divide, jeopardizes national development.

Fundamental changes in the currently available educational patterns are, therefore, in order. In other words, there should be a shift in paradigm in curriculum planning from the established order that is academic in nature to a natural order that is functional. By implication, the curricula should largely be need-based, not discipline- or institution-based. Of necessity, this process, being an ongoing one, caters to the needs of even those who are already in service. Continuing reskilling and retooling the workforce thus changes the status of education from a one-time affair to a life-long one. However, no single educational institution can provide all the necessary information, skills and attitudes to cope with the changing world order. Nor should people be ordained to get exposed to limited knowledge horizons. Networking of peoples and institutions therefore gains significance in this context. In essence, defying barriers of various kinds, technology enables educational institutions to be global providers of education and the people, global citizens. Because of its inherent flexibility, open and distance learning (ODL) is better equipped to meet all these requirements than any other learning systems, and using the power of digital ICT, it can accelerate the process of change.

DIGITAL ODL MEANS

Time was when anything short of classroom education was looked upon with disfavour and considered relatively substandard. Influenced by their familiarity with the formal system of education that espouses physical contiguity as a learning-prerequisite, skeptics among the academics and the elite alike loathed ODL, in which most of the time during the teaching/learning process, the learner and the teacher are spatially away from each other. Recent trends in the higher educational scenario in the world over, however, have demonstrated a discernible change in the attitude towards ODL. The embracing of the paradigm shift from teaching (or teacher) to learning (or learner) has, as a consequence, rendered the copious discussions of the credibility/viability of ODL part of history. So convinced is the humanity of the art and science of ODL that no longer are we to labour its socio-academic relevance.

Following the advent of open education, and its subsequent recognition as a complementary system to the classroom education, it was hailed as an educational system marking the beginning of the end of elitism in education. Its inherent flexibility has indeed helped bring tertiary education to many across societies, who would have otherwise been denied of education for reasons ranging from income poverty, geographical barriers, cultural mooring to personal disabilities. The practices of most ODL systems, in terms of assuring quality of learning packages (product) and student support (service), have been exemplary proving their ability to simultaneously address the issues of equality and equity in education. However, technological innovations have brought the open distance mode of teaching and learning under different perspectives and scrutiny. For instance, though access has been, and still is, the operative word in the context of ODL, advancements in ICT and their educational applications have added newer dimensions to its meaning. No

longer is the word restrictive in the sense of educational/learning access. It is the access to technology that seems to determine one's access to information, education and learning.

Put differently, against the existing and emerging digital ICT, the traditional ODL systems, the instructional mechanism of which depends primarily on print supplemented by audio/video technologies, look anachronistic. The awesome power of digital ICT in generating and disseminating information, and in providing versatile learning environments is unparalleled in the human history. In other words, in order to provide the learners with reliable, current and relevant information and to help them assimilate the information thus provided, in a short span of time, ODL institutions consider ways of integrating appropriate digital ICT into their systems of operation. We are also aware of the growth of virtual universities, using various online learning environments – some of which developed in universities, while the rest in corporate houses. There are MIT (Massachusetts Institute of Technology) and ILO/SFU (International Labour Organization/Simon Fraser University) initiatives to create Open Source wares to support online instruction as well. And, as recently as April 2002, under the aegis of the Commonwealth of Learning, a Commonwealth virtual university for small island states was under consideration to serve about 30 Commonwealth member countries with populations of less than 1.5 million people. It is important to note that this impetus for creating a virtual university serving member states on different continents with different needs and resources comes in response to growing concerns about the digital exclusion, weak economies, geographic isolation, exposure to civil conflict, natural and human disasters that severely constrain the ability of many small states to deliver adequate widely accessible higher education (Dhanarajan in *The Chronicle*, 2002).

Assuming that the required infrastructure for facilitating online instruction is in place, one can entertain either of the views given below:

(i) Digital ICT-mediated/enabled instruction brings education across the globe without being constrained by territorial boundaries, and it is a good thing to happen because rich learning environments can be provided irrespective of whether the learner is in the USA, Uganda or East Timor, and thereby reduces the technology-induced neo-elitism among countries.

(ii) Digital ICT-mediated/enabled instruction caters to the needs of just one section of the society, the section that has buying capacity, irrespective of where the learner is, and thereby contributes to in-country neo-elitism.

Acknowledging the merit in both views, the paper however, seeks to discuss some of the possibilities within ambit of ODL institutions to overcome the issue of in-country neo-elitism, with a caveat that no single, standard recipe is in sight to remove disparities in societies.

In a World Bank report (1998a), it was stated that the costs of using a computer with an Internet connection in a school in the Latin American and Caribbean countries was much less expensive per pupil than broadcast television, but substantially more expensive than radio. True that studies have found that the use of digital ICT is more expensive than instruction delivered by older technologies like print and radio, but less expensive than instruction delivered by television (Potashnik and Capper, 1998). And, Osin (1998) estimates that the annual per student cost of providing computers for instruction in developing countries at US$ 84, which is a huge sum for a developing country like Guyana or India, considering its student population. At US$ 84, however, if 30 computers were used 300 days per year, 10 hours per day, as a resource to raise the skills and education levels of all members of the community, not just students, Osin estimates that the cost would decrease to US$0.34 per hour of interaction and concludes "There is no alternative system known that may provide the benefits possible by integrating computers in the education systems, while at the same time servicing the whole community." As Potashnik and Adkins (1996) have pointed out, "even in countries which do not believe in the cost effectiveness of information technology as a tool for mass education, it is important that they begin acquiring experience using this technology for educational purposes. Otherwise educators in the developing countries will be marginalized in the international dialogue on education." Is there a message for the ODL institutions in the developing countries? The message is loud and clear: be resourceful.

For example, it is not difficult for an institution like the Indira Gandhi National Open University (IGNOU), India with its enormous capacity and facility to reach a cumulative student-clientele of about 700, 000 in the length and breadth of the country, to create ICT-mediated/enabled learning environments. On the lines of Osin's suggestion, through its more than 600 Study Centres, the University can service the communities in which they are housed with the help of the University's projected 40 FM radio stations and 2000 television satellite downlinks. Similarly, with its 3 campuses and about 30 university offices in 16 countries of the Commonwealth Caribbean, the University of the West Indies could extend its reach to the communities through its distance education operation. Just replace the Indian and Caribbean contexts with any other where there is an ODL system, you will still see the merit in the argument. A reorientation of the ODL operations is, therefore, in order.

To reach the technology-haves and have-nots, technologies must be used innovatively. That is to say, such technologies as CD-ROM, radio and cable television can be combined with the Internet to deliver information, instruction and robust curriculum. For example:

- **Phone-In, Radio-Mediated Internet Access**: This strategy allows radio listeners to make requests about information on topics of relevance. The radio stations/broadcasters can search the Internet, access the information and broadcast it subsequently. ODL institutions can, working in tandem with the governments and/or private operators of radio stations, establish such phone-in radio services. Through a service of this kind, the needs of ODL students as well as local communities can be addressed using local language(s). This also transcends the language problems and overcomes issue of literacy-requirements to access the Internet.

  It is important that we use hybrid technologies to reach the population targeted, and accordingly, it is important for us to note that radio technology has been keeping up with the diverse demands. The transistor radio has been one of the greatest innovations and now is the solar-powered crank that obviously does not require batteries or electricity – both can make radios too expensive or too difficult to access to some. In the near future, we may begin to see digital radios and digital recording devices used for teaching/learning purposes where interactivity, yet again, takes on a whole new definition. That is, students and teachers will be able to be truly interactive by digitally sending messages to one another, as one would be able to do in an Internet environment.

- **Information Research and Resource Cell**: Besides housing information gleaned from the Internet in print or CDs, the Cell (or call it by any other name), if established in the ODL institutions, will search the Internet on specific requests from faculties and provide them with the necessary information, which when suitably adapted can find its place in the course packages adding value. (That IPR issues are to be taken into consideration is not dealt with here). The Cell can thus prove to be a valuable resource for the faculties in that it can help them enhance the currency of their course packages. However, establishing a Cell of the kind suggested might sound superfluous, if we assume the likelihood of individual faculty members themselves searching the Internet and doing what is necessary. Fair enough. Granting faculty participation in this strategy, the suggestion nonetheless should be seen against the context where the Internet access is not so pervasive as we might want it to be.

  In addition, beyond equipment and software, appropriate content is necessary to make use of ICT for educational and awareness purposes. Content creation and identification therefore is important. We know that though some online content is specifically designed for educational purposes, most is not. We also know that despite many tools that are available to locate the information needed, at present finding specific educational materials on the WWW can be likened to a “scavenger hunt”, often resulting in wasted time and unexpected results. In addition, because of varying technical standards, materials created with one interface/platform may not be usable in a different technical environment, and this should also legitimize the need for the Cell of the type suggested. While consuming the information available, it is also quite possible that the institution itself contributes to new knowledge to plug the gaps, as it were, and this is another advantage of digital ICT. In other words, not only does digital ICT empower users to consume information, but also to produce it. With a computer, printer and desktop publishing software, anyone can produce high quality printed materials. With an Internet connection and a website, any individual/organization can ‘publish’ the content derived from local knowledge and experience.

- **Research and Development (R&D) and Innovative Partnerships:** R&D is not a major strength in most of the ODL systems, unlike in some of the formal educational systems. So is partnership. ODL systems must create Research Funds as well as Skills Development Funds or some such, to carry out research studies and development activities. In the current scenario what with information explosion, a sense of interdependence must emerge among ODL systems and between ODL/on-campus systems and industries.

  In the global market, the focus of companies may be on, for example, doubling the computing power and not halving the price of computers. Can’t ODL systems by forging partnerships with local/regional/international computer scientists and industries to produce a cheaper computer with basic facilities? Once designed, such computers can be useful for schools and rural communities, if not for professional software engineers. Furthermore, it is not impossible for ODL institutions, in collaboration with public and private sectors and Non-Governmental Organizations (NGO), to establish mobile Internet cafes.

- **Multipurpose Learning Cafes**: Most ODL systems operate in decentralized environments in which local offices – distributed across the countries, functioning as an interface between learners and the institutions – support head offices. They can serve as open-access Internet cafes and/or serve as centres, where CDs containing downloaded and edited information can be made available to the public. Collaboration, including

cost sharing, between education and industry to build ICT infrastructures can make this a reality. ODL systems can also negotiate with the respective governments to provide some incentives (e.g., tax) to the participating industries. Instructional systems also can be designed in such a way as to require students to carry out some community services. For example, where computer students are available, projects involving the development of technical plans including wiring architecture, network management, technical support required, etc., for local community centers/schools are possible. On a specific day, students of other disciplines can do the related work to set up the network. Or, at these multipurpose learning centers, training programmes for using digital ICT can be organized.

Such projects as the MIT-Singapore Alliance (i.e., partnership between MIT and National University of Singapore and Nanyang Technological University) can also be properly adapted. The MIT-Singapore Alliance facilitates engineering students from Singapore to access the laboratory in MIT through the Compaq's WebLab initiative at the MIT campus. This may be an expensive affair for a developing country, but the possibilities of capturing the process on industry/broadcast quality videos/CDs can be explored and the same can be made available at a later point in time to students at these cafes.

These cafes can also function as rural information centers for local communication and Internet access using solar/electric power and wired/wireless communication. Farmers, for example, can access information such as market prices, enabling them to sell their produce directly without having to depend on the intermediaries.

- **Wireless Internet Access**: Typically, the Internet access is provided through telephone lines, and this restricts the access. Among innovations in wireless applications, it is reported that the Indian Institute of Technology created in 1999 a low-cost Internet access system that needs no modem and eliminates expensive copper lines. Can ODL institutions make enquires and examine the system's usability and relevance? Even pocket computers are being exploited for instructional delivery. For example, it is reported that two Canadian colleges are testing the effectiveness of wireless learning. For this purpose, they use handheld Compaq pocket computers and access the Internet through a wireless network operated by Bell Mobility (Bell Canada). The students will be able to download course material, including their textbooks, and communicate with fellow students and their instructors.

- **Information Literacy**: For purposes of our discussion, by information literacy is meant a combination of computer literacy (i.e., operation of PCs – in generic sense, use of emails, word processing, spreadsheets and of presentation tools, etc.) and the ability to find the required information, assimilate and create information, and use other communications technologies for collaboration (Nishimuro, 2001). Although there has been a considerable increase in ICT teaching in many schools and universities around the world, new multimedia tools are still widely underused or used only to supplement conventional teaching methods. There is also a lack of solid and creative training materials that cater for the specific needs of the developing countries. ODL institutions should see in this gap an opportunity, and make available courses pertaining to information literacy. This is important, given that today's shift towards the extensive application of ICT has given rise to a range of new industries with a potential for new economic productivity. To participate in and benefit from this trend, developing countries need to build information literate societies.

REFLECTION

Reiterating the fact that there has been and is a one-to-one correspondence between technology innovations and human development, this paper observes – based on the course international politics, trade and economy takes, and the dynamics of technology – that it is foolhardy to entertain the assumption that there will be any significant reduction of the technological disparity in the near future. Digital exclusion will, therefore, remain a reality of life and characterize the network age in which the technology-starved countries will continue to strive to catch up with the affluent ones, and any other way of thinking is tantamount to assuming that there is a cap in technological innovations, when there is none in fact. This is no admonition of doom. Far from it, what this paper suggests is that developing countries must recognize their duty to contribute to the efforts to level the digital playground without waiting for a turnaround of international trade regulations including IPR, which is not going to happen. Developing countries must learn to capitalize on their population – often referred to as a problem that plagues poor countries – by investing in them. What this simply means is seeing the opportunity in the problem. Doesn't more people mean more human resources? However, to benefit from these resources, developing countries must have a strong political will, commitment and enabling public policies for human development, not merely populist ideas/measures and slogans. To accelerate the process of this development, what medium is better suited than ODL?

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