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<th>Learning technologies: transmitting information or transforming education.</th>
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INTRODUCTION

Some five years ago, John Gardner,\(^1\) a one time Secretary of State for Health and Education under the Reagan administration and current professor at Stanford University, was reported as saying that "I am entirely certain that 20 years from now we will look back at education as it is practiced in most schools today and wonder that we could have tolerated anything so primitive." Listening to some of the experiences and visions presented at this meeting over the last three days, perhaps Professor Gardner may have been right in his prognosis after all. Having travelled quite extensively across Commonwealth countries over the last three years, I cannot help but feel the experiences described are exceptions and not the norm. By and large, our traditions of teaching and learning (in that order) have undergone very little change from the days of Aristotle. Notwithstanding, there is a strong lobby that is emerging which argues for the "exceptions" to become the "norm". At the forefront of this lobby is not academia, but political forces and perhaps commercial interests. They believe that the technologies of today and those that are emerging will transform the teaching landscape to an extent where it will be neither economically or socially acceptable to cling to ancient traditions.

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\(^1\) Gardner, John W. As quoted in Surviving the information age by J. Carrol. Prentice Hall, Canada.
There are at least three very good reasons to support a re-engineering of the educational process in today’s environment. There may be more, but in my mind the three that I wish to mention are critical if we seriously wish to consider learning technologies as essential tools in the enhancement of educational access and process. The three that I consider important are demand and diversity, technology and capacity and finally quality and transformation.

**Demand and Diversity**

The provision for learning is becoming more open and accessible. Many factors contribute to this changing educational culture. Important among these are the economic, social and technological forces. These forces are worldwide in their scope and, in terms of their power, seem to have a profound impact on business practises, manufacturing processes, financial services, government policies and, more recently, on our teaching practises and learning behaviours. It would not be an exaggeration to say that, as we approach the end of this century, we are also moving irrevocably in the direction of changing the way we think about information, knowledge and learning.

In addition to the environmental change, there is also a change in the nature of those requiring education and training. Communities are no longer contented (nor should they be) to limit access to education and training to the fortunate few who are able and literate, live in urban communities, have access to communications, infrastructure and classrooms, have the knowledge of when, how and what to learn and the resources to pay for it. A fairer, kinder and more concerned humanity requires that the education we provide must be made available to a whole range of new clients including:

- **Those who are functionally illiterate**: In addition to the almost 900 million illiterates globally, there are approximately half as many adults who cannot cope with the demands of daily life on the basis of their prior literacy levels.
- **The physically challenged**: Annually, on the continent nearest to you (Asia), about 15 million people become disabled as a result of war, diseases, accidents and malnutrition. Their major hope of self-improvement is to pick up skills for self-improvement.

- **The long-term unemployed**: Long-term unemployment is a debilitating pathology; training people in such situations poses special challenges to delivery and pedagogy.

- **Out of work youth, especially boys**: This group requires vocational training to be part of a productive economy. A combination of apprenticeship, employment and self-education needs to be designed to assist them. This group is highly vulnerable to socially disruptive behaviours.

- **Women and girls**: In many parts of the Commonwealth, women and girls still find themselves marginalised from participating in education and training; ways may have to be found to circumvent the social, cultural and economic impediments.

- **Refugees, recent immigrants and non-nationals**: Today, roughly 125 million people live outside their countries of origin. This flow of people for political, social or economic purposes is not expected to slow down. To better enable the process of settling down, educational programmes, teaching language, social and job skills, have to be designed and delivered.

Apart from the social concerns, individuals and governments are beginning to recognise that planning for “competitive advantage” will require a labour force that has literacy and numeracy skills beyond three to six years of primary schooling (which is the current situation in most industrialised and newly industrialising countries; it is grimmer in all other developing nations). Globally, some two billion people who are in today’s workforce will continue to be there well into the first quarter of the next century. Their knowledge and skills will need continuous renewal. To this, we need to add a further one billion young children and adults who will require initial education and training. The level of supply (or lack) of education and training for this huge demand for initial,
continuous and lifelong education using present patterns of delivery is not encouraging. The challenge of providing education and training to a huge and diverse population with a variety of learning goals and styles, at an acceptable cost, will require new forms of educational delivery, globally. Notwithstanding the scepticism of many in the academic community, recent reports from agencies such as UNESCO, the Organisation for Economic Co-operation and Development (OECD) and the World Bank seem to say as much. In some ways, the emergence of the new technologies may have something to do with the push to drastically change the nature of the learning environment.

In North America, the arrival of the newer technologies certainly seems to have stimulated a resurgence of interest in diversifying methods of knowledge delivery. Almost on a daily basis, one is told that yet another web-based course is available from one university or another. Even before the arrival of the new technologies, many Commonwealth institutions undertook the challenge of providing good quality, mass, flexible and lower cost education for remote learners at the basic and primary (such as the Correspondence School of New Zealand), secondary (as delivered by the National Open School systems of India), technical (presented by the Open University of Sri Lanka), under-graduate (by the Open University of Hong Kong) and post-graduate (through the UKOU and the Indira Gandhi National Open University) levels.

Admittedly, any transformation of educational systems cannot ignore a role for technology in the delivery of that education. There are several reasons why this is so, but a few stand out as immensely important. These are:

- **The short supply of talent**: On one hand, the planet is filled with highly skilled and talented people in all fields of human endeavour. On the other, critics of global educational systems have constantly bemoaned the fact that, by and large, the academic talent found in our schools, colleges and universities needs to enhance the quality of the learning environment beyond levels of mediocrity. We need excellence in our teaching and we need to source our teachers from
the best in the community and distribute them to the whole learning community. The Western Governors Virtual University initiative among the North Western States of the USA is, in fact, attempting to do this. This attempt envisages going beyond campus walls to source academic “teaching” talent. Contributors to courses will come from business, commerce, industry and government, and users of the courses will include ordinary people along with thousands of college and university students.

- **An unmet demand:** Since the end of the last World War, the planet has expanded its educational provision at all levels. While in proportionate terms, we congratulate ourselves for having achieved near universal basic, primary and more secondary and post-secondary education, in sheer numbers, the number of people still needing education at all levels is astronomical. To be a globally competitive economy, the renewal of peoples’ knowledge, especially those in the workforce, is vital. If we also include our desire to build a nation of informed and knowledgeable citizenry for the functioning of a healthy democracy, then this planet’s demand for educational opportunities is truly staggering. No conventional system of educational delivery can meet this demand. Using technology may provide some relief, and using technology in partnership with others may provide lots of relief.

- **Changing patterns of learning:** Full-time study within time-tabled constraints of the classrooms is only accessible to a few; for many who wish to study, learning will have to occur at a time and place of their choice. The growth of open schools, polytechnics and universities as well as the numerous suppliers of correspondence and on-line education are all manifestations of people’s desire to learn at their convenience rather than at an institution’s call.

- **Just-in-time training:** The rapid changes that are taking place in the workplace will require training to be delivered quickly. Such training needs to be high speed and low cost and should reach small and large
groups. Traditional ways of delivering training is time consuming, labour intensive, socially disruptive and costly.

- **Information explosion**: It is said by those who study this area that the total amount of information which becomes available doubles every four to five years. Stating it another way, the total of all human knowledge that was available to an undergraduate in 1997 will be less than 1% of what will be available to a student in the year 2050.

Teachers have to become expert in helping learners navigate through this sea of information rather than pretending to be effective transformers of that information into knowledge for the learners. Students must be trained to bring about this transformation. Those who survive this information explosion will be able to deal with it effectively, and more importantly, turn it into knowledge.

**Technology and Capacity (Costs)**

Those of you who are more familiar with the technologies than I am, will know that almost on a daily basis one is informed of yet another technology product that will make the technologies friendlier, faster, cheaper, more accessible and will have greater capacity. Already we have DRAM chips with a capacity of 256,000,000 bits with speeds going up to about 500+ megahertz. I am also told that with this chip in place, the other things that can also happen are:

- **High speed communication networks**, enabling teachers to work together to jointly develop courses. Some learners in rural and remote areas are already being provided with video conferencing and computer conferencing facilities.

- **Digital satellite radio services**, incorporating high quality radio channels, texts, even photographs, are envisaged to reach more than 4.6 billion people in the developing world.

- **Hybrid products**, combining digital TV, personal computers and internet services are envisaged to succeed interactive television, providing users with one comprehensive set of on- and off-line sources of information. Program developers will not need complex
computing skills to do their creative work as the machines will have them.

- Willing teachers, supportive administration and motivated learners getting together to create a learning environment that is open, interactive and challenging.

There is perhaps, one snag in achieving all of these great potentials. In a 1995 report by CERI\(^2\) of the OECD, authors examined a range of technologies from electronic publishing, narrow and broad casting by radio and television, audio and video conferencing as well as digital networks. The report concluded that while the older technologies were used for limited instructional purposes, the newer technologies, like the electronic and digital networks, were used mostly for the transmission of information through electronic mail, bulletin board systems, computer conferencing and electronic data base retrieval. The report concluded by stating that “the essence of the educational culture is not seen to be changing; at best instructors and institutions are using technology to replicate their practise, their content and their control . . . The influence of technology on schooling, learning, teaching and the educational organization has not been significant across the range of post secondary education.”

Though there has been even greater changes in the technology environment since 1994, in as far as the educational environment is concerned, the situation does not seem to have changed significantly. In a more recent report coming out of Australia, authors Craig Cunningham et al,\(^3\) mention that “The use of new technology and new media is in many cases still in its experimental stages . . . This may well change in the future, as programs become more established and appropriate technological infrastructure becomes more widely available.” In the next section of this presentation, I would like to share with you, what I think are


the issues that need to be confronted if the hype of technology is to be realised to make a difference to global education.

In the OECD countries, the reluctance to apply learning technologies more enthusiastically may be rooted in serious fundamental educational processes and their values. In the non-OECD countries, this is further compounded by three other factors. These, according to a recent report by PANOS, are:

- **Poor telecommunications infrastructure**: The level of “teledensity” has not reached the stage where the Internet can function efficiently. One telephone line per 1000 heads of population is not the greatest of assets when contemplating an educational service for large parts of the poor world. Coupled to this is a lack of access to “bandwidth”.

- **Cost of appliance**: It is said that problems of access to telecommunications pale into insignificance besides those of gaining access to a working computer capable of connecting to the Internet. The International Telecommunication Union comments that an inhabitant in a poor country is around 8,000 times less likely to have access to a computer than someone from an OECD country. Even as recently as 1996, one in three people globally lacked access to electricity. Analysts claim that the cost of putting a computer in every home with the necessary telecommunication infrastructure will continue to be prohibitive in the medium term. Consider this as an example: the average cost of a personal computer is 15 times the per capita GDP of Ethiopia.

- **Know how**: at least three specific kinds of skills are relevant, necessary and in short supply. These are:
  - **Participatory skills**: from computer literacy to a working knowledge of English for involvement in networked learning.

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4 PANOS Briefing: The Internet and poverty (Briefing No. 28, April 1998. London, UK).
Facilitating skills: for the design, implementation and maintenance of networks. These require technical knowledge in installation, user training and maintenance at the minimum.

Control skills: to manage the enterprise.

Cost of services: Poverty is not the only problem facing those wanting access to the Internet. In many countries, policy and regulatory restrictions make it almost impossible for a vast proportion of their population to have access to inexpensive telephone and Internet services, due to monopolies of one kind or another. As another example, in the USA, the average cost for an ISP (Internet Service Provider) to lease a high capacity line is around $3,800. The same line will cost about US$180,000 a year for an Argentinian ISP. Access to the Internet in Canada is about US$15 per month, for China it is about US$70 per month.

Quality and Transformation

Advocating the use of technology, especially one that propounds remote learning, will require some fundamental changes in the current system. These changes will challenge institutions that provide the educational service; they will test user capability for such services and question governments’ policies and regulations. The following may be important for serious consideration:

The first challenge is the re-orientation of our teachers and the pedagogy they apply to their vocation. The fraternity still has to come to terms with a new type of learner and a learning environment that encourages the learner to be independent. Whether it is a radio or television programme, print or web-based instruction, it is recognised that individuals are capable of self-learning if provided with cleverly and sensitively designed instruction, even if they are poorly equipped to utilise the technology, imaginatively and non-mechanically.

The second challenge is to change the nature and structure of our ‘teaching’ organisations. The traditions of teaching and the views on
learning have resulted in organisational structures that are almost and completely centred on faculty. From the design of the curriculum to its transformation into learning experience; from decisions relating to assessment of prior learning to elements of exit standards; from administrative arrangements to academic governance; and from delivery systems to learning schedules.

- **The third challenge** is to remove the 'time' driven element from today's schools, colleges and universities. These are ruled by time, prescribing when, in his/her life, a student can or is ready to learn and the length of time required for learning. A report of a task force to the International Council for Distance Education recorded: "The instructional paradigm, therefore, holds learning prisoner to time constraints applied by an arbitrary force or by the preferred work schedule of a faculty member. In the desired [new] learning paradigm, learning becomes the primary driving force and, since learning can occur at any time and at any place 24 hours every day, the constraints of time are removed." The technologies allow those who provide education to break the rule of time.

- **The fourth challenge** is overcoming the perceptions and the fear of faculty to the changing nature of their roles and values as well as the rewards of the new learning environment. There is a real, though unfounded, fear on the part of faculty of losing total control of the teaching and learning environment. This fear manifests itself in many forms. Some teachers express anger at the perceived loss of academic freedom and others express disdain at the 'commoditisation' of knowledge; some express dismay at the loss of employment and others worry about the loss of quality. Learner centrality in the educational environment does pose enormous challenges to the teacher. It requires pedagogical skills, especially in a technology-mediated environment, in which many of today's teachers are either inadequate or totally lacking. Serious steps have

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to be taken to reduce the anxiety of teachers and avoid alienating them from a development that is so crucial to academe and its survival.

- **The fifth challenge** is the appropriateness of the curriculum. Providers of educational services, whether of the formal or informal kind, cannot continue to behave as though their services and the knowledge products that they develop have little relevance to the world of work and living. The real world has been going through a dramatic change – learning and training are needed by people who will have to function in a globalised economy and the information age. These learners need to understand themselves through an understanding of the world (UNESCO's Delors Commission)\(^6\) and should have the following skills:
  - *Communication skills* to work in a multicultural environment;
  - *Problem solving skills* that require the ability to frame problems, ask the right questions and apply the information technologies to solve them;
  - *Working in teams*: made up of individuals with different backgrounds and cultures. Part of these skills will also include the ability to lead, negotiate and collaborate; and
  - *Self-learning skills*: to be a lifelong learner would entail identifying what needs to be learned and how to acquire that learning.

- **The last in my list of challenges** has to be the access to technology (telephone, television, radio, Internet) by learners. Even as we near the end of the century, some 500 million people may not have made their first telephone call let alone use the Internet. Most of the non-users are found in Sub-Saharan Africa, South Asia and Latin America. In her book, *The Death of Distance*, Frances Cairncross\(^7\)

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quoted an International Telecommunication Union report, which stated that in some African nations (Sierra Leone, Uganda, Zimbabwe), the number of people has been increasing faster than the number of telephone lines. While in the short-term, this seems to be a big impediment, the longer-term view, by all accounts, appears to be promising.

However, the high level of scepticism that is being encountered among the academic circles around the world is not promising. There is a certain fear that the use of technology and the promotion of networked learning will lower the value of the educational experience, erode quality irreparably, diminish jobs and job opportunities, eliminate academic freedom and inquiry and demean scholarship. This scepticism coupled with fear has led, in some cases, to campus unrest and, in others, from outright hostility to experimentation, innovation and application. Change has never been achieved without discomfort. Those vested with the leadership of our academic communities can only attempt to reduce the level of acrimony, encourage open debate and discussion and provide as many training and retraining opportunities as possible to facilitate this major cultural change.

Technology, whether it is print or multimedia, does not teach; the techniques we adopt simply enable the delivery of teaching from narrow to mass catchments, and simultaneously shift the responsibility of learning away from the teacher to the learner. In the process, it transforms the relationship between teachers and learners. While we are entering the era where multimedia and hypermedia are bringing together, under one umbrella, the essence of print, audio and video signals, computer-assisted instruction and conference and group learning, at the heart of the teaching and learning transaction will be institutions and teachers. Our challenge is to create pedagogies of learning within which modes of delivery will contribute to effective learning. Before the arrival of the newer technologies, communities of distance educators around the world have been at the forefront conducting changes in the educational environment. The circumstances under which practises have been developed took into account the requirements of learners who used distance education and also needed:
• Increased and flexible access to information (isolated learners, preoccupied with other demands of living, require a variety of channels to access information on both academic and administrative matters).

• Increased and flexible opportunities for interaction between mentors and peers (freedom from time-tabled environments to conduct their learning).

• Increased student time on tasks (pacing the learning through devices that set tasks and deadlines for judicious absorption of information, skills or knowledge and completion of learning).

• Opportunities to control their pace of learning.

• Learning that is relevant to their daily lives (curriculum that is appropriate and sensitively transformed into learning experience).

• Greater response to their individual circumstances (mass education does not necessarily have to dehumanise the learning process).

• Regular and sensitive encouragement to continue their learning (counselling for success).

As the forces surrounding the educational environment impel educational institutions to move away from being elitist, exclusively high-cost, campus-based and faculty-centred to an environment where the focus is on the learner, access is mass, cost is low and the world is the campus, some fundamental shifts in the methods of teaching and learning will have to take place. Accompanying these shifts will be the legitimate concerns about the quality of the venture. This is especially so in societies that have traditionally held education in high regard. Those of us who ventured into distance education between the mid-sixties and seventies will recollect, with pain, the stigma of the commercial correspondence schools culture that we inherited and which took the better part of the last 30 years to leave behind. On the basis of these three decades, let me briefly reflect on a few aspects of quality that we need to remind ourselves of, even as the fascination for remote delivery of education becomes increasingly popular.
By deliberate design, practitioners of distance education have been instrumental in making some fundamental changes to long-held beliefs about where, when and how teaching and learning should take place. The critical issue is not where the students are located, but whether they can interact with a teacher or teaching programmes. Bringing about the desired levels of interaction between students, teachers and programmes will require subscribing to a list of good principles.

Apart from good practise, which must be a vital consideration for the delivery of education using technologies, there are three other aspects that are crucial. These are:

- **Access**: Supporters of the use of learning technologies will claim that their educational mission is to provide access and equality of opportunity for learning, especially to individuals and groups who have been denied this before. As has been argued before, success in providing access is not a sufficient condition for claiming greater opportunity. ‘Equality of opportunity is a matter of outcomes, not merely resource availability’; in other words, providing access is merely a starting point and equality can only be achieved if the people provided with such opportunities are assisted in achieving their goals.

- **Cost considerations**: Cost-efficiency and effectiveness of technology mediated systems are overriding concerns for all of us. These considerations have a major impact on policy issues and any measurement of the quality of a distance education system will have to take account of costs and benefits.

- **Infrastructure**: Delivering education to students off-campus needs infrastructure that is supportive of the teaching and learning environment. This infrastructure should have, among other items, the following essentials:
  - Those delivering content must have the skills to use teaching methods that are resource-based;
  - Such teachers must be trained and provided with the technology to perform their tasks;
Adequate provision for students to have access to the emerging communications and information technologies;

- Management reconfigures institutional resources and invests them in the production of knowledge products and the pathways to deliver the products; and

- Management prepares itself to cope with a diverse make-up of its students, their goals and the context within which they learn.

CONCLUSION
The multimedia bandwagon is an attractive one. More than any other previous technology, it promises to change the ways in which we can impart skills and knowledge. But for it to be of sustainable value in the educational provisions to nations, a whole new way of doing business must be developed. As Kenichi Ohmae\(^8\) once said in another context:

"It is hard to let old beliefs go. They are familiar. We are comfortable with them and have spent years building systems and developing habits that depend on them. Like a man who has worn glasses so long that he forgets he has them on, we forget the world looks to us the way it does because we have become used to seeing it that way through a particular set of lenses. Today, however, we need new lenses. And we need to throw the old ones away."

\(^8\) Ohmae, Kenichi. As quoted in \textit{Surviving the information age} by J. Carrol. Prentice Hall, Canada.