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Abstract

The exponential growth in the ambit and application of communication technologies during the the closing decades of the 20 the century, have far reaching relevance to education, its expansion and quality. The implications of the growth in communication technologies impacting the very nature of learning process and education system, are equally far reaching, necessitating a continuous reassessment with respect to its effectiveness and scope. The traditional roles assigned to school, classroom and teacher and the expectation of the society in terms of quality of education are changing at a very fast pace. Concepts like the Learning Society, Interactive Technologies, Collaborative Learning, Knowledge Industries and Virtual University are not only transforming the way education is being imparted but is also changing the transmission of education itself.

The paper discusses the trends in the application of Learning Technologies and cites the examples in several Asian countries including China, India and Pakistan. It also takes note of the barriers/limitations of Learning Technologies in the context of shortage of trained manpower and inadequate technological infrastructure in the developing countries.

Learning Technologies : Transmitting or Transforming Education

V.S. Gupta

The closing decades of the 20th century shall be remembered for the exponential growth in the ambit and application of communication technologies which have far reaching relevance to education, its expansion and quality. The implications of the growth in communication technologies impacting the very nature of learning process and education system, are equally far reaching, necessitating a continuous reassessment with respect to its effectiveness and scope. The traditional roles assigned to school, classroom and teacher and the expectation of the society in terms of quality of education are changing at a very fast pace. Concepts like the Learning Society, Interactive Technologies, Collaborative Learning, Knowledge Industries and Virtual University are not only transforming the way education is being imparted but is also changing the transmission of education itself.

New Information and Communication Technologies (NICTs) have brought human kind face-to-face with fundamental changes: by abolishing distances, they are instrumental in shaping the societies of tomorrow; the most accurate, up-to-date information (in fact information as the events are developing) is now available to anyone, any where in the world, often in real time and reaches the remotest regions. Interactive media makes it possible not only to send and receive information, but to engage in dialogue, discussion and the transmission of information and knowledge, irrespective of distance or operating time. The harnessing of the potential of communication technologies for educational purposes — not in the restricted sense of structured formal academic system, but by way of opportunities for life long learning available throughout the life span of an individual, has been another notable characteristic of nineties which has brought about a conspicuous shift in the paradigm of education and learning.

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The dramatic emergence of information societies has led to a revolution in communications in the shape of multimedia systems and the spectacular expansion of information technology networks. The Internet has doubled the number of its users and networks as well as its volume of traffic each year since 1988. Even though the impact of the expansion of Internet is still limited, particularly in developing countries, owing to the relatively small number of people with the necessary technology and know how; every thing suggests that an unstoppable revolution is in progress which will make it possible to transmit an ever increasing mass of information in shorter span of time. At the same time, thanks to the falling cost of equipment, the new technologies are steadily finding their way into every aspect of work.

In his book, **The Death of Distance**, Frances Cairncross points out : The death of the distance as a determinant of the cost of communicating will probably be the single most important force shaping society in the first half of the next century. Technological change has the power to revolutionize the way people live, and this one will be no exception. It will alter, in ways that are only dimly imaginable, decisions about where people work and what kind of work they do, concepts of national borders and sovereignty, and patterns of international trade.

The death of distance will also give rise to proliferation of ideas. New ideas and information will travel faster to the remotest corner of the world. Third World countries will have access to knowledge that the industrial world has long enjoyed. Communities of practice (communities guided by common interests, experiences and pursuits rather than proximity will bind these communities together) and long distance education programmes will help people to find mentors and acquire new skills.

Learning to Be—Life Long Education

The Report of International Commission on the Development of Education, 1972, **Learning to Be**, The world of education—today and tomorrow, articulated the concept of lifelong education as covering the entire educational process, from the point of view of the individual and of society. It first concerns the education of children and, while helping the child to live his own life as he deserves to do, its essential mission is to prepare the future adult for various forms of autonomy and self-learning. This later learning requires many wide-ranging educational structures and cultural activities to be developed for adults. These, while existing for their own purpose, are also a pre-condition for reforming initial education.

Lifelong education thereby becomes the instrument and expression of a circular relationship comprising all the forms, expressions and moments of the educative act.

The educational needs of the population have greatly expanded, both in the developing and developed countries. The educational system should, therefore, be geared to meet the requirement of not only the large numbers of people to be reached, but also in terms of new disciplines, curricula and subjects in tune with demands of industry and economy. A vast responsibility rests with the educational planners in formulating workable strategies towards providing educational opportunities for those who missed out in the first instance. Many thousands of working young people and adults in many countries are looking for a chance to complete elementary, secondary or higher education -- those who were not given the chance to receive formal education during their adolescence because of the shortage of school; those who have missed their chance, dropping out school or college, because of financial, health, family or other reasons.

Since human knowledge is rapidly expanding, in many fields, degrees gained years ago are no longer adequate qualifications. The introduction of new technology, new production methods, new techniques advance more rapidly than the setting up of new specializations and new curricula at colleges, universities, and other academic and vocational education establishments. In recent years much attention has been given to the more and more urgent continuing education needs of the graduate force.

At the same time the rising aspirations for better quality of life have also induced several sections of society to pursue higher education. These students -- retired/retiring defence personnel, housewives, in-service staff who wish to attain higher educational qualifications for improving their employment prospects, are pursuing higher education through distance education and open learning institutes. For the older generation -- bitten by the higher education bug, age is no bar. It is obvious that the distance education and open learning institutes, which have come up in a big way, not only in the developed countries, but more so in the Third World countries could not have fulfilled the task of imparting education but for the use of communication technologies on a large scale.

The role of the teacher -- the key to the success of the educational system -- also has to be changed; instead of dispensing information and knowledge he has to guide the students in the acquisition of knowledge from the ever expanding learning resources. All these

developments have led to a dramatic expansion in the Open and Distance Education not only in schools, colleges and universities but also in industry and commerce.

Distance Learning and Educational Technology

The Open and Distance Learning System would not have created a viable and lasting niche for itself, within the overall traditional educational system of classroom teaching and university education, but for the extensive use of media and communication technologies.

As technology advances, the ideal of learning, "what you want, when you want, where you want, and at your own pace, "becomes possible and life long learning is no longer just a slogan. The report of the International Commission for the Study of Communication Problems --*Many Voices, One World* says : The rapid development of communication in most countries, the expansion of various forms of mass communication and in particular of audiovisual communication, combined with the spread of informatics, open up new horizon and multiply the linkages between education and communication. There is an evident increase of the educational potential of communication. Endowed with a greater educational value, communication generates an "*educational environment*". While the education system loses the monopoly of education, communication becomes itself a vehicle for and subject for education.

In recent years, a series of exciting new technological developments have significantly expanded and enhanced the instructional potential of television. Likewise computer technology has advanced at a remarkable pace, and should play a key role in the future educational expansion. The electronic media offers new dimensions to expand educational opportunities, to improve the quality of instruction, and to increase the cost effectiveness of the present educational system.

In poorer countries, teachers often account for 90 percent of the education budget, so the easiest way to cut costs is to increase class size. China has taken that to the extreme: the Central China Television University has one to two million students, more than the rest of the world's distance-learners put together. The presentation is said to be fairly utilitarian: a television camera is pointed at a lecturer, and the result is relayed by satellite to classrooms all over China. But for many countries, a similar programme may be the only alternative to no higher education for many people.

Where communities are scattered, distance learning offers particularly big savings. The

University of the South Pacific has a satellite-based network linking its main campus in Suva, Fiji, with its agricultural college in Western Samoa and other centers in nine Pacific-island nations. The result has been savings in staff travel time and costs and a decline in dropout rates for students.

Even in rich countries, more and more higher education and training will probably be delivered long-distance, either to special classrooms in companies or at other locations, as is typical in the United States, or to students in their homes (and, in the case of some, prison cells), as in companies such as Hewlett-Packard and Xerox will spread to campuses in due course of time even in the developing countries.

Advanced communication technologies such as videotex, teletext, videodisc and computers are being used for education in developed countries. Being expensive and sophisticated, these technologies are not frequently used in developing countries for educational purposes.

Tele-education, by all means, has been considered to be a landmark development. The extensive use of television for educational purposes in Asia in the two most populous countries of the region -- China and India, the limitations of being one-way medium notwithstanding, is indicated by two important developments : (1) The largest distance teaching institution of the world, the national multimedia distance learning institution in China, is called the Central Radio and Television University (CRTVU), and (2) One of the largest communications experiments in which television programmes were received by local viewers directly from space -- Satellite Instructional Television Experiment (SITE) was conducted in India for a period of one year from 1 August 1975.

China is one of the pioneering countries in the world to have exploited television medium for expansion of education. The CRTVU, employs broadcast as the main delivery vehicle and supplements it with print, audio-visual media, tutorials, and computerized instruction. Programmes are broadcast directly to learners at home, in the workplace or the study centres located throughout the country. The CRTVU courses follow a multi-media approach. The input of non-print media varies according to the subject area -- science and engineering courses have greater proportion of TV programmes, whereas radio is the chief medium for social science courses. TV programmes are transmitted by the Central China Television (CCTV) nationally through the microwave network.

The CRTVU -- the apex institute, is backed up by the Provincial Television Universities. Academic programmes are offered in a large number of disciplines including engineering, sciences, economics and management : Academic courses are designed on a nation wide basis, but provincial universities implement the guidelines provided by the CRTVU. Enrolment and examinations are controlled centrally and most eminent writers and presenters are invited to produce TV programmes.

The remarkable aspect of the working of CRTVU is the expansion of its operations in rural areas to meet the shortages of technically trained manpower. The CRTVU has been able to create a vast network to meet the shortage of educated persons in various fields and also to meet the demands of fresh graduates from high schools. Since it is not possible for the provincial universities to meet these demands.

In a country like Pakistan, where most of the population is illiterate, the role of television as an educational institution is of real importance. The Pakistan TV made substantial contribution to adult education; adult education programmes were broadcast regularly and adult education centre were established in rural areas equipped with television sets. Its instructional programmes, which include physical education, calligraphy, fine art, legal consultation and education about traffic rules, are transmitted regularly. It also includes various programmes to boost civic sense and lectures on different courses taught at Allama Iqbal Open University have been a regular feature of educational programming.

In India the Countrywide Classroom (CWCR) project of the University Grants Commission (UGC) has been the logical outcome of the successful SITE experience. The rapid expansion of television in India during 1984, facilitated the launching of the above programme, aimed primarily for the undergraduate students of colleges located at different places. The contents of CWCR programmes are not linked to any examination, these are neither based on a particular syllabus. Instead these telecasts seek to provide new insights, bring new findings and take the students to various places and laboratories they would rarely see. The project aims at the widest possible utilisation of television's potential to improve the quality of university level education. India, in fact, has one of the largest networks for producing quality education software which include Audio-visual Research Centres (AVRCs) and Educational Media Research Centres (EMRCs) -- under the aegis of the UGC. The establishment of the Indira Gandhi National Open University (IGNOU) represents the government's attempt to provide higher education through the use of multi-media distance teaching methods.

Educational Teleconferencing

The emergence of the new forms of electronic media like teleconferencing is of particular interest for distance learning because of their interactive capabilities. The use of electronic media components as an essential part of the multi-media approach to distance learning has always been a dream for those working in developing countries.

Teleconferencing is an interactive electronic communication among two or more locations. The punch word here is interactive and it is indeed this quality of interactivity that really distinguishes teleconferencing from the conventional one way media like broadcasting or narrowcasting.

Teleconferencing is an already accepted form of technology in advanced countries, especially for business communications. It is only a matter of time for this technology to become popular in developing countries as necessary infrastructure like telephone links and satellite are being made available. Usually, the attraction for adopting teleconferencing is said to be the savings it results in minimizing physical travel. The time-saving involved in this process is also a significant factor. Experience of advanced countries in this process is also a significant factor. Experience of advanced countries in which teleconferencing is in wide usage shows that apart from economy and time saving, this technology improves corporate efficiency and enables participatory management.

Generations of Learning Technologies

Interestingly the distance education theorists during the recent years have attempted to classify the use of teaching aids and technologies into generations. A general classification is as under :

1. Generation I —Mailable materials : including print material and audio and video cassettes.
2. Generation II — Education through Air : Broadcasts, Telecasts, Talkback TV
3. Generation III — Computer based teletechnologies : CD-Rom, Multi-media and Internet
4. Generation IV — Technologies of Immediate Future : Virtual Classroom

In one of his papers in *Media Asia*, Dahlan says : The excitement and enthusiasm to get plunged into the information highway, for instance has propelled a part of our own societies (A small segment, to be sure, but the most influential segment nonetheless) to live in two societies at the same time : the real society in our own country and virtual society. To live simultaneously in both real, physical space and in cyberspace. We may not know or be able to evaluate which is real and which is virtual.

Virtual Classroom and Virtual University

The World Bank, in its **World Development Report, 1998-99, Knowledge for Development** points out as to how expanding telecommunications holds the promise to improve every developing country's capacity to absorb knowledge by providing opportunities for high quality, low-cost adult learning. The Virtual University of the Monterrey Institute of Technology in Mexico is a consortium of collaborating universities including 13 outside the country. It enrolls 9,000 degree and 35,000 nondegree students each year in Mexico and other Latin American countries. It delivers courses through printed texts and live and prerecorded television broadcasts, with communication between students and faculty aided by computers and the Internet.

The African Virtual University, headquartered in Nairobi, seeks to increase university enrollments and improve the quality and relevance of instruction in business, science, and engineering throughout Africa. In each participating country, a local institution is competitively selected to oversee operations. This institution provides hardware and software for interactive courses, registers students, supervises study programmes, offers a structured study environment, and awards local course credit. The university has installed 27 satellite receiver terminals throughout Africa and developed a digital library, to compensate for the dearth of scientific journals in African universities. Although it is too early to assess results, such initiatives are reason to hope that new technology can make a big contribution to narrowing knowledge gaps.

In an interesting paper, Desmond Keegan from the University of Dublin recapitulates his observations about teaching and learning in a European Virtual Classroom. Keegan defines Virtual Classroom as :

A Virtual Classroom comprises an electronic classroom from which the class is taught, a network of specially equipped electronic classrooms at which the students are present, and

the satellite, microwave or cable linkages between them. For teaching purposes, virtual classrooms can either be two-way video with two-way audio, often called videoconferencing or more accurately video teaching' or one-way video and two-way audio.

Transnational Teaching—A Reality

Transnational teaching face-to-face at a distance is now a reality and successful systems have been reported in the literature. There is, for instance, cable from Dublin to Stockholm, so it is entirely feasible to set up a two-way video, two-way audio virtual classroom between the two cities. For the first time a student fidgeting in Stockholm could disturb the teacher and the rest of the class in Dublin or a student in Dublin could interact with the teacher in Stockholm.

David Hawkrige mentions the existence of Virtual Online University in the USA which was established in April 1994.

The Corporate Mission Statement of Virtual Online University is :

- ☐ to provide low-cost, high-quality education;
- ☐ to offer distance education using interactive, interdisciplinary methods outside of traditional learning paths;
- ☐ to assist traditional and non-traditional learners in furthering their educational objectives;
- ☐ to form working relationships with business and industry to provide students with valuable hand-on experience to supplement a liberal arts education;
- ☐ to conduct research and provide a practical forum for investigation of online environments and applications in distance education, telecommunications and electronic delivery systems.

According to Dr. William Painter, Executive Director, VOU will " ... target two primary audiences : first, current college and university students in traditional education paths who wish to broaden their opportunities with online education; and second is the non-traditional, learning-disenfranchised person, that is, individuals who have limited access to traditional education due to financial restrictions, physical challenges, being part of at-risk population, or with responsibilities which preclude pursuing traditional educational paths."

In the Asian region dissemination and sharing of knowledge within the structured education system are still basically class-room oriented, paper-intensive processes. Those institutions which take advantage of advances in technology, especially those linking their schools to powerful networks, rich data bases and instructional equipment, will be able to provide quality educational opportunities to greater numbers and perhaps ultimately in a cost effective manner.

Limitations/Barriers of Learning Technologies

The learning technologies offer valuable opportunities to expand educational infrastructure to improve the quality of instruction, and to increase the cost-effectiveness of present educational systems. However, they also can become educational "white elephants" that consume a nation's financial resources without effectively delivering the much needed instruction that was originally hoped for. Media projects, with their heavy initial start-up costs, represent an especially unnerving, educational gamble for developing nations. While their potential to reach large numbers of students may be tremendous, if that potential is not realized, the financial losses can be staggering, especially for an already impoverished country. The implementation of large educational media projects is generally very complicated, and the possibility exists for major difficulties to arising in different ways. (*Educational Media in Retrospect, Discussion paper-Education and Training series, the World Bank 1987*).

2. The unique potential of electronic media to transcend geographical barriers create logistical challenges. The modern electronic media are seen as a means to overcome vast distances, overcoming topography, and underdeveloped communications infrastructures. So educational media projects are designed for some of the least accessible regions. It is no wonder that some of these projects fall short of expectations, when they are carried out in the hope that they may transcend adverse circumstances that cannot be overcome in any other way. Another managerial challenge is the difficulty of overseeing such a complex range of projects, which include procuring equipment, hiring personnel, producing programmes, distributing written material, dealing with international agencies, etc. To further complicate matters, many of these activities involve a high degree of technical expertise, so that various specialists must be brought into the project. Administrators some times do not fully understand the needs of these technicians.

3. In most of the Asian countries access to personal computers, modem, and domestic TV, telephone and VCR for the learners may not be feasible for years to come. Therefore,

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creating a Virtual University in the Asian context would continue to be a vision for a large number of Asian countries. Technologies such as audio cassette players, television and VCR, even though familiar to the students, constitute essentially leisure and entertainment media and till such time as sustained efforts are made to reorient these technologies for instructional purposes, these may not be adequately used as such.

A caveat needs to be entered regarding over-optimism of the effectiveness of the Educational Technologies in certain situations. Educational television, for instance suffers from certain limitations, the most serious being the element of anonymity inherent in its very operation. It is strictly a one way communication. The teacher-taught contact, considered vital all over the world, is almost missing in the case of television no physical contact, no physical identification, no scope for repetition, clarification or elaboration.

The Report of the International Commission for the Study of Communication Problems also pointed out :

Technological innovations open up vast new possibilities. However, a world of caution is necessary: they are not instant miracles, but tools to be introduced and used only after careful consideration is given to all possible resulting ramifications. Each has particular potential, yet none is an isolated means; they are parts of a total system, which should be planned and shaped bearing in mind the integration of all its parts. Technological innovations can often have negative effects, both economic and social, and may distort directions and priorities for overall development activities. However inviting, introduction of some new technologies is often easier than subsequent provision of software required for their optimum utilization. This requires the attention of each national community and all its elements—governmental, public and private.

In a paper, *Application of Interactive Technologies in Open and Distance Learning : An overview*, AW Khan and Patricia McWilliams, detail comprehensively barriers to the use and expansion of educational technology in a significant way. The authors have articulated the dilemma, frequently mentioned in the context of the limitations to the applications of educational technology in distance education programmes.

It would be remiss not to recognise the present lack of available technical infrastructure of sufficient quality to support distance education on a wide-spread basis in many countries and regions of the world. Although here too one can be

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optimistic given the speed of growth and penetration in this sector we are still, in many instances, dealing with 'dirt roads in the age of the information highway' and we are driving on that road with tractors, not high performance sports cars of the 90s. In practical terms, it is extremely difficult to effectively deliver quality education using an audio-conferencing system when half of the receive sites are off-line due to technical difficulties at the local telco! A further important component to an efficient technical infrastructure is experienced and trained human resources, a commodity which often requires several years to develop adequately.

NICTs and more conventional multimedia, are all too often perceived as panaceas, universal wands, that can bring about revolutionary educational change and immediate progress in developing countries. If care is not taken, the developing world is likely to be strewn with the sad remains of highly expensive communications equipments, unused and unloved as far as teachers and students are concerned, while education continues in an expanded, but still traditional and perhaps impoverished manner. But it does not have to happen. Success depends upon ensuring that media technology fulfils the needs of learners, teachers, employers and society.

Notes

Since NICTs are being extensively used for educational and learning purposes; in several countries technology based education is developing into online instruction; and the terms being used are not only Learning Technologies but also New Learning Technologies (*see Mirza JS, IJOL, 7(1), 98; pp. 89*) these terms are being used interchangeably.

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