India in the Knowledge Economy: An Electronic Paradigm

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ABSTRACT :

The authors at the Department of Electronics Accreditation for Computer Courses (India) present the basis and a way forward for a knowledge-based economy in India through expanded utilization of e-learning techniques. This paper makes a strong case for investing in information technologies for increasing the human resource capital to raise the economy of the country. In a country of more than one billion people and of continental dimension, economic development can only be reached through better utilization of e-learning. Here we have reviewed various e-learning aspects including the technologies and projects to facilitate e-learning, and have proposed some suggestions for improving the management of e-learning. Academic bodies such as the University Grants Commission, the Knowledge Commission, the Institutes of Information Technology, and software companies should pool their efforts to establish knowledge processing techniques to help teachers and students pursue learning, and thus contribute to long-term economic development. Accelerated telecommunication growth, better internet penetration with wider bandwidth and more software applications for e-education are needed for overcoming the digital divide to achieve growth, in coordination with grass-roots developmental work in schools. We urge and support traditional institutions to put their energies into information and communication technologies for providing e-instruction.

INTRODUCTION :

As we enter the 21st century, technology is permeating nearly every facet of our lives. Eight of the 10 fastest growing occupations are expected to be computer-related. Innovative technological systems will become common features of nearly every workplace and home. Technology integrated curricula are increasingly proving to be an effective means to inculcate 21st century skills in education. Dramatic changes in their knowledge levels are being witnessed by harnessing the potential of ICT, which can help students in raising their knowledge levels by learning problem-solving techniques, and developing analytical and critical thinking skills which have become of utmost importance in today's competitive economy. There is no denying that we are in the midst of a general-purpose technological revolution.

While some explain this revolution by different names such as ICT (Information and Communication Technologies) or IT (Information Technology), it is nonetheless a technological revolution, which has brought about a renaissance in our lives. ICT has had major repercussions for developed countries where universities no deliver education over a mobile telephone. ICT has not spared developing countries like India. The World Wide Web has been a major revelation which has transformed our lives. According to most accounts, the World Wide Web was created when Tim Berners-Lee programmed its first version at CERN (Conseil Europeen pour le Recherche Nucleaire), in November 1990. As Prof. Dertouzos, former Director of the Massachusetts Institute of Technology (MIT) Laboratory for Computer Science noted, the World Wide Web has become an important part of our lives throughout the

world. The world economy is undergoing a fundamental structural change thanks to globalization and this new techno-economic paradigm. Technology is going to definitely change and restructure education at all levels ranging from schools and universities to professional training and lifelong learning. We are living in a knowledge society ; a society which devotes its intellectual and technological capital towards its own future development. Earlier neo-classical economics recognised only the two factors of production : of labour and of capital.

Knowledge, productivity, education, and intellectual capital were all regarded as not contributing to the factors of production. Knowledge was not regarded as a resource but stemming from the work put forward by economists such as Joseph Schumpeter, Robert Solow and others, Romer has proposed his New-Growth Theory, an alteration to the neo-classical model by considering technology as well as the knowledge on which it is based as a central part of the economic system. Knowledge has become the third factor of production in leading economies. To quote the Human Development Report 2001, which says "technology is like education – it enables people to lift themselves out of poverty. Thus, technology is a tool for, not just a reward of, growth and development".
Education systems have gained importance keeping in view technological as well as economic growth over the globe and have geared up to confront this challenge using SWOT (Strengths, Weakness, Opportunities, Challenges) analysis. Since the advent of the Internet the use of technology in education has exploded. ICT has become one of the corner stones of this revolution. Advancements in the field of information and communication technologies (ICT) are accelerating these trends. Countries in Asia and the Pacific have responded positively and steps have been taken so as to confront these challenges in different forms and at varying levels so as to enable their people to become accustomed to change. Resistance to change in the use of ICT in education has been muted, and the challenges have been

accepted gleefully. Skillful change management has encouraged modernization and promoted the capability to apply knowledge and solve upcoming problems with confidence. For incorporating ICT into education, policies and strategies have been developed. The effect, in the last few years, is the birth and development of a new class of workers that the French sociologist Erik Neveu (2001) names "workers of the symbolic," actualizing what Peter Drucker (1965) has already defined as "knowledge workers": their specialization is not the production of anything, but the building and circulation of meanings.

The ways we live, work and intermingle have changed and will continue to change considerably by the expansion of information and communication technologies (ICT) and the surfacing of knowledge societies. Our educational systems must be equal to the task and should respond consequently, not only in endowing students with ICT skills, but in making the best use of the latent advantages ICT offers in developing teaching and learning. The use of ICT in education is being nurtured well in the countries of Asia, and in India in particular. As the presence and use of ICT continues to swell, universities and other educational institutions will need to develop performance indicators for monitoring the use and upshots of technologies, as well as to make these transparent to educational stakeholders, financial support sources and the public at large. Relationships among the use of technology, restructuring in learning framework, empowerment of teachers, as well as the alteration in teaching and learning processes can then be elucidated using these indicators. "Those of us in the business of professional education, however, must make predictions on a regular basis. Our task of preparing students for careers several years out has become increasingly complex as the rate of change has accelerated. In order to keep pace with this change, policymakers have opportunities and obligations to move forward with a new direction for teaching and learning in the 21st century ; all educational stakeholders must collaborate in

creating a new vision for education" (Maurizio & Wilson, 2004, p.27). Technology should be seen as a catalyst for endorsing creativeness, empowerment and parity, turning out efficient learners and problem solvers and not just as an end in itself.

2. METHODS :

2.1 e-Learning – An Overview :

Jay Cross, a CEO of e-learning Forum, a 1200-member think tank and advocacy group, and founder of Internet Time Group and a veteran of the software industry as well the training business coined the term "e-learning" in 1998. There is a very wide and ongoing debate as to what is e-learning and different authorities have their own viewpoints. E-learning is a vast and a multifaceted topic, and it is hard to find a generally established definition. Dublin says that the truth is that the term e-learning means different things to different people. It became popular in the U.S. in 2001 and was often referred to as computer-based training (CBT) delivered over intranets and the Internet.

Several questions regarding the definition of e-learning emerge. According to some authorities, e-learning is defined as online coursework / assignments for learners at a distance, while others use the term to imply virtual learning environments to facilitate the deliverance of education in universities. Many others say it is just an online tool to augment, develop, apply and broaden collaboration. So it is yet to be established that it is blended learning or just online learning. e-Learning is "the delivery of a learning, training or education program by digital means, e-learning makes the use of a computer or electronic device (e.g. a mobile phone) to present training, educational or learning material" (Stockley, 2005). This definition given by Stockley is very encompassing and is relevant for the scope of this paper.

2.2 e-Learning – Why ? :

Traditional universities that we all know of are made up of a number of buildings, which house the various disciplines, the libraries, the classrooms and laboratories. There is an auditorium, which is used occasionally for ceremonial occasions. The university is linked to the world beyond through its front doors, by snail mail, telephone or the World Wide Web. ICT has its own implications for universities and has become inevitable. IT infrastructure has become an essential criterion upon which students and researchers chose their school and therefore is an indispensable duty for a university willing to remain competitive (McCredie, 2003). Firstly, global ICT infrastructure is installed such as a virtual world. In other words, the university's educational setting is acquiring another shape in the form of a virtual educational environment. Secondly, subject material is no longer contained in people and books, but can be accessed through the infrastructure of computers internet-worked with each other. And thirdly there is the new organizational structure. The functional framework of universities will have to be re-structured. The academicians will retain their autonomy for those tasks where autonomy is essential and a natural outcome of their work. This implies, for instance, that the bureaucratic management to arrange financial support for fundamental research will have to be dismantled to a certain degree.

e-Learning is coming up as a challenge to the 'bucket theory' or the banking concept of education which works on the assumption that the instructor owns the knowledge and deposits it into the passive students attending the class. Moreover teaching in a traditional set-up has its own limitations and a traditional teacher can never provide 24/7 services to his or her students which can be delivered through e-learning. New delivery systems that increase the effectiveness of learning at a distance, new organizations such as virtual universities, and other models of teaching and learning are forcing higher education to change the way they do business (Mangan, 1998 ; Oblinger, 1997 ; Selingo, 1998).

3 RESULTS :

3.1 Academic Bodies in India and e-Learning :

Talking of e-learning and academic bodies in India, it is imperative to mention UGC-INFONET. Arun Nigavekar who was Chairman of the University Grants Commission (UGC) in 2002 decided that the universities and colleges should also reap the benefits, which ICT had in store for them. The deliberations of the various committees led to the setting up of the UGC-INFONET towards the end of 2004. UGC also joined this crusade of introducing e-learning.

Wholly funded by UGC (University Grants Commission), UGC-INFONET provides electronic access to scholarly literature available over the Internet in all areas of learning to the university sector in India. Most universities affiliated to UGC are members of the programme, and gradually it will be extended to colleges as well. This programme was executed by the Director, Information and Library Network (INFLIBNET) Centre, Ahmedabad, which is an autonomous institution under the UGC. Access to various e-journals has started from January 1, 2004. Cooperation between the UGC, ERNET (Education and Research Network) , the Inter-University Centres IUCAA (Inter-University Centre for Astronomy and Astrophysics), INFLIBNET and CEC (Consortium for Educational Communication), and national and international publishers has made this programme possible.

In the United States, ASTD (American Society for Training & Development), which is the world's largest association dedicated to workplace learning offers various courses in e-learning such as E-Learning Courseware Certification. UGC realizing the potential of e-learning along with CEC, an inter-university centre of UGC which is offering a course *e-Scripting* which is an e-course in scriptwriting for films and television, and this has had 471 registered members enrolled to date.

For enhancing the ICT skills of teachers, organizations such as the NCERT (the National Council of Educational Research and Training), and NCTE (National Council for Teacher Education) have been launching schemes from time to time. Producing ICT-enabled teachers on a large scale within a short period in a big country like India with millions of teachers at different levels is a mammoth task. The problems are complex, and the issues are numerous. UGC too conducts IT/ICT orientation programmes for university and college teachers through Academic Staff Colleges.

3.2 e-Learning Initiatives in India :

India is using powerful information and communication technologies such as open source, satellite technology, local language interfaces, easy to use human-computer interfaces and digital libraries and so on with a long-term plan to reach the remotest of the villages. Mission 2007 http://www.mission2007.org aims to provide knowledge connectivity to every village of India by August 15, 2007. Community Service Centres (CSC) are being started all over the country. Forays have been made in the field of e-learning in form of *Brihaspati*, an e-learning platform developed as open-source freeware which IIT Kanpur has developed, and this *Brihaspati* has been used since January 2003 supported by the Ministry of Communications and Information Technology, Govt. of India. Faculties are using this platform to post their lecture notes, handouts, and reference materials (in electronic format) on the Intranet for supporting their classroom teaching. *Brihaspati* has also been deployed at over 75 universities and institutes across India, and the list is growing. Yet another project to provide web-based training is the National Programme on Technology Enhanced Learning (NPTEL), which is being funded by the Ministry of Human Resource Development (MHRD) and was first conceived in 1999 to pave the way for introducing multimedia and web technology to enhance learning of basic science and engineering concepts. This project was launched on September 3, 2006. Significant infrastructure has been set up earlier for production of video-based teaching material by the Indian Institutes of Technology (IIT),

the Bangalore-based Indian Institutes of Sciences (IISc) and Technical Teacher Training Institutes (TTTI). This caters to the need of students in all disciplines of engineering, and registration on this site http://nptel.iitm.ac.in is free to students. The Oversight Committee on the Implementation of the New Reservation Policy in higher educational institutions has chosen this model to emulate. Sharing resources from NPTEL, in the South, there is the Kerala Education Grid portal http://www.edugrid.ac.in and this has been designed to increase and facilitate access to education resources by the educational community and to facilitate collaboration, sharing of knowledge, best practices and co-operation to improve the quality of education and learning. It is a project Funded by the Department of Higher Education, State Government of Kerala, coordinated by the Indian Institute of Information Technology and Management (IIITM), in Kerala.

For the thousands of Indian students who are unable to pursue studies in the United States, there is now another way to have access to American professors while studying at Indian colleges. During his US visit the Indian Prime Minister, Dr. Manmohan Singh signed a Memorandum of Understanding between Indian Department of Space, Department of Science and Technology (DST), Amrita Vishwa Vidyapeetham and many American universities of prominence. The e-learning project under the aegis of the Indo-U.S. Universities Network launched by President A.P.J. Abdul Kalam in December 2005 has initiated a partnership under which U.S. professors visit India for special lectures. The ISRO, the Department of Science and Technology (DST) and the Indo-U.S. Science and Technology Forum support the initiative. http://www.amrita.edu. Even the Rashtrapati Bhavan has a 'virtual classroom'. The President's Virtual Institute for Knowledge (PREVIK) is an attempt by the President, A.P.J. Abdul Kalam - a great academician - to reach out to students, teachers and scientists all over the country, even in remote locations.

Also worth mentioning here is *Vartalaap*

which is a computer-based solution over a computer network that creates an environment modeled closely on a real-world classroom. The virtual classroom system can be a very useful and effective support facility to enhance the learning experience especially for distance learning course participants. The Indian Space Research Organisation (ISRO) has successfully launched an exclusive satellite for educational services EDUSAT ("The Indian Satellite for Education") on its board Geosynchronous Satellite Launch Vehicle, GSLV on September 20, 2004. The main aim of the EDUSAT pilot project was to demonstrate the concept of multicasting interactive multimedia for the educational sector and augment distance education capabilities in the country. It is a collaborative project of the Ministry of Human Resource Development (MHRD), and the Department of Space Indian Space Research Organization (ISRO). ISRO has taken up the 'Tele-Education' by launching EDUSAT, a satellite totally dedicated to the nation's need for education. In early 1999, the Tamil Nadu announced its intention to establish a Tamil Virtual University designed to promote the Tamil language, literature and culture internationally through the medium of Internet-linked computers. The university has come into existence and is offering high quality Tamil education over the web. The President of India launched MHRD's *Sakshat* - a one-stop educational portal as a pilot project recently. With content developed by UGC, AICTE, IGNOU, NCERT, KVS, NVS, CBSE, IITs and IISc, *Sakshat* will provide links to vast resources and other links available on the web. *Sakshat* aims at tapping talent and will address all education and learning-related needs of students, scholars, teachers and lifelong learners. By next year the portal will be accessible to students in 700 cities. CDAC (Centre for Development of Advanced Computing) a Scientific Society of the Ministry of Communications and Information Technology, Government of India has launched *e-Sikshak* as an e-learning framework offering free courses in Telegu, a regional language through its portal.

Other e-learning efforts in India include *Gyan* Darshan which was launched on January 26, 2000 as a exclusive higher education TV channel on *Doordarshan* to provide quality distance education, as well as *Gyan Vani* a network of 17 FM radio stations and *Chukki Chinna* Interactive Radio Instruction programme which also received Manthan-AIF Award for best e-content practices in a regional language, i.e Kannada, for tutoring primary students in mathematics, social studies, science and so on and is being broadcast on All India Radio. At the school level, SchoolNet India which was incorporated by Infrastructure Leasing & Financial Services Limited (of India) as part of a broader initiative has created an environment that encourages and supports ICT-integrated pedagogy.

The Concept of Computer Assisted Learning Centre (CALC) was conceived by Azim Premji Foundation in response to the need of the people in rural Karnataka. The immediate objectives were attracting children to schools, creating excitement in and around the school, simplifying difficult concepts thereby making learning exciting and fundamentals strong and creating sound foundation to IT literacy. The CALCs target Government Higher Primary Schools (Std. 1-7), and have been operational since 2001. They are now covering the states / UTs of Chandigarh, Chhattisgarh, Delhi, Gujarat, Karnataka, Orissa, Pondicherry, Punjab, Rajasthan, Tamil Nadu, and Uttaranchal - encompassing over 10,000 schools. The efforts have been quite effective in creating scalable models significantly improving the quality of learning in the schools, and in ensuring satisfactory ownership by the community in the management of the schools.

At the institutional level, many institutes - mainly private as of now - have entered into online distance education, and the private sector in India has already geared up for this challenge. The much-talked-about NIIT Varsity offers training to 500,000 students annually through a network of nearly 3500 centers spread across 33 countries. One of the world's leading management schools IIM Calcutta amongst others entered into a strategic alliance with NIIT, Asia's largest IT trainer to offer executive development programmes through virtual classrooms. Researchers, academics, teachers, and students worldwide are excitedly embracing blogs (web logs). Chennai, capital of Tamil Nadu, a state in South India played host to the Bloggers' conference held at the TIDEL Park . CDAC and IGNOU are two of the India's most esteemed organizations in their respective fields, which have held conferences in the field of e-learning. "Online education is coming up as the biggest challenge to distance education in the near future," according to Prof H.P. Dikshit, the former Vice-Chancellor of IGNOU.

4. CASE STUDIES IN INDIA :

4.1 Jadavpur University :

In the 2000-01 session, the School of Education Technology, Jadavpur University started a new interdisciplinary 3-semester (1-year) master's degree course, the first of its kind in India, entitled *Master's in Multimedia Development.*

Jadavpur University has been evolving a model of Multimodal Digital Distance Education (MMDDE) and has applied the concept for dissemination of postgraduate education. The M.Tech IT (in courseware engineering) and the *Postgraduate Diploma in Multimedia and Web Technologies* are being offered in MMDDE format.

The postgraduate diploma is the first formal AICTE (All India Council for Technical Education) approved PG course of its kind in the country. The modes of dissemination methods being used are print material, CD-ROM-based self-learning packages, education through web-based learning environment, live broadcast of some lead-lectures by eminent academics through video conferencing and one-way video with two-way audio for interaction, real-time chat facility, online quiz and assignments, and with laboratory and project work at work centers. The courses are conducted at Jadavpur University. Besides this, the courses are also being conducted through their distance education

partners at their respective work centres such as at the Centre for Development of Advanced Computing, Kolkata, and CMC Ltd, Kolkata, a subsidiary of Tata Consultancy Services Limited. The examinations are conducted in the conventional manner as is done in classroom methods at Jadavpur University. Jadavpur University is the recipient of Hewlett Packard Foundation's Global Technology for Teaching award for 2006-2007. HP will help Jadavpur University establish a mobile learning (m-learning) center where students taking the M. Tech. course in Distributed and Mobile Computing can access content using hand-held computers. The university already has a digital library, and a content management and development system using an m-learning authoring tool.

4.2 BITS Pilani Virtual University :

BITS Pilani is a technology university currently offering master's degrees and doctoral programmes in various areas of science, the humanities, management, and various branches of engineering and technology. At present, BITS Pilani has three full-fledged campuses at Pilani, and at Goa in India, and at Knowledge Village, Dubai in the UAE. These programmes were earlier offered to only on-campus students but since the launch of their virtual university http://vu.bits-pilani.ac.in, courses in B.S. Engineering Technology, B.S. Information Systems, M.S. Manufacturing Management, M.S. Software Systems are being offered online. The e-learning programme at BITS Pilani is an extension of its distance learning programme that was started in early 1979. BITS has considerable significant expertise in distance learning pedagogy and instructional design. To make its model of distance learning scalable, BITS conceived and designed the BITS Virtual University (VU), sponsored by the national Department of Information Technology. For enriching the learning experience at BITS Pilani, a new project Embryo has been launched which aims to make the BITS alumni - 200 of whom are professors - accessible to the students at BITS. Their alumni can leverage the power

of the Internet and communicate with the students through videoconferencing. Moreover, this project aims to broaden the scope of collaborative research among students, BITS faculty and the alumni.

4.3 Online Education with Hughes Escorts Communications Ltd. (HECL) :

Hughes Escorts Communications Limited (HECL) http://www.hughes-ecomm.com is a joint venture between Hughes Network Systems (HNS) and Escorts Limited providing networking solutions using satellite media. HughesNet Global Education platform seeks to re-define the next generation of education by using real-time Interactive Onsite Learning (IOL). The platform seamlessly integrates the strengths and advantages of the traditional methods of education with the latest in technology. Using a powerful interface, HughesNet Global Education enables a student to have highly interactive sessions with students and instructors all over the country, using video, voice and data. Over the last two years, over 4750 students have successfully completed various programmes on this platform, demonstrating its efficacy and effectiveness. These programmes are convenient, accessible, and targeted to suit the continuing education needs of the students. With 50 classrooms in 34 different cities in throughout India, HughesNet Global Education has made higher education simpler than ever before. Hughes has tied-up with the premier institutes of India (and abroad) which include the Indian Institute of Management (IIM) Kokhizode, Kolkata, Bangalore Xavier's Labour Research Institute (XLRI) Jamshedpur, Indian Institute of Foreign Trade (IIFT), Delhi & Manipal University, Narsee Monjee Institute of Management Studies (a deemed university), Apollo University, and the Loyola Institute of Business Administration.

4.4 Visvesvaraya Technological University :

In Karnataka, the Visvesvaraya Technological University (VTU) was the main beneficiary of the pilot project under the first phase of EDUSAT implementation.

Under this pilot project, all engineering colleges of VTU have been networked with one hundred nodes. The e-learning website http://e-learning.vtu.ac.in of VTU was launched by the Deputy Chief Minister, Siddaramaiah, Karnataka, on January 8, 2005. Their website has enabled students to access quality content materials in various subjects, in various media including graphics, video and well-designed notes, free of cost. VTU is collaborating with ISRO (Indian Space Research Organization) to provide high quality technical education in rural areas and is helping in bridging the gap between rural and urban areas. Using this EDUSAT network, VTU is training students in such skills as engineering, problem solving, leadership qualities, communication skills, experimental skills, teamwork, time and crisis management, techno-entrepreneurship development, design orientation, creativity, and in career planning.

4.5 The e-Learning Network of Amrita Vishwa Vidyapeetham :

Launched on May 15, 2004, this initiative uses satellite technology to seamlessly connect the four Amrita Vishwa Vidyapeetham campuses at Amritapuri, Bangalore, Coimbatore, and Kochi. Jointly run by Amrita University, and ISRO (Indian Space Research Organization), this project has transformed Amrita University into a fully interactive, multi-disciplinary, multi-media, virtual campus without geographical limitation. Students at any of the Amrita campuses attend and actively interact in lectures taking place on the other campuses. Amrita University is the main beneficiary of the U.S. Universities Network launched by President A.P.J. Abdul Kalam with the objective to enhance science and engineering education throughout India. Under the three year Memorandum of Understanding, the engineering faculty from the US are encouraged to spend a semester in India giving lectures from the Amrita University campus which is serving as the platform for the project. Using EDUSAT - a satellite developed and launched by ISRO - the classes are then transmitted to the students

throughout India. The DST will be designing the curriculum and will provide the course materials. The project is expected to reach over 200 universities. The various disciplines of collaboration include computer science & engineering, information technology, electronics & communication, manufacturing, biotechnology and bio-informatics, nano technology, healthcare, and others. The first series of Indo-US classes commenced from July 2006 with lessons delivered from the University of Illinois and Buffalo.

4.6 DOEACC Society :

The DOEACC Society of the Department of Information Technology, Ministry of Communication & Information Technology, Govt. of India is the premier organization for human resource development in the areas of information electronics and communication technology (IECT). The DOEACC Society is interalia implementing a joint scheme with the AICTE and DIT, Govt. of India, to generate qualified manpower in IT by utilizing expertise available with computer training institutes in the non-formal sector after due accreditation of the courses. It has more than 900 centres spread across various locations mapping the whole of India. The DOEACC has 10 centres of its own at Aizawl, Aurangabad, Calicut, Chandigarh, Gorakhpur, Guwahati / Tezpur, Imphal, Jammu / Srinagar, Kolkata, and at Kohima *(Regional Institute of E-Learning and Information Technology - RIELIT)*. The DOEACC centres at Aurangabad and at Kolkata have been conducting a programme *Training of Trainers in e-learning* with the objective to propagate e-learning and its applications among teachers to integrate the e-learning methodology and approach with conventional teaching and learning to improve educational pedagogies. The DOEACC centres of implementation at Kolkata and Aurangabad have developed their e-learning environment and culture for the past two years and are working closely with their respective state governments to phenomenally scale up these efforts. A part of the focused 10-month programme for capacity building of human resources in e-

learning - *Comprehensive programme for building e-Learning Institutions* - was conducted by Crystal-GTZ, Germany, at DOEACC Centre, Aurangabad. The examinations for the computer literacy course *Course in Computer Concepts* is being conducted online assisted by the National Informatics Centre (NIC). Over 5000 students undertake this examination yearly using Computer Aided Paperless Examination Software (CAPES)**.** The DOEACC Centre at Imphal http://www.doeaccimphal.org.in is offering a 6-month *Course in Computer Applications* online on the MOODLE open-source Learning Management System (LMS). The DOEACC Society has envisaged to work extensively on implementing e-learning pedagogies during the XIth Five Year Plan period.

5. DISCUSSION :

5.1 From BPO to EPO :

During ancient times, India had some of the prominent institutions of higher education like Takshashila and Nalanda, which attracted students from different parts of the world to come here for information and transformation. India has become a hub as far as the BPO sector is concerned, but after the BPO sector time for the education process outsourcing EPO, thanks to e-learning which is India's new emerging service offering and is getting wide support from students and clients in the US, European Union and other developed countries because of their shortage of knowledge workers. Hall (2001) reports "e-learning is the fastest-growing and most promising market in the education industry". Market intelligence service provider IDC had estimated the world e-learning market to touch $23 billion by January 2006 from the earlier $15 billion. The Indian e-learning market is estimated to be between $10-20 million with a potential to grow at 150 per cent.

The expression Education Process Outsourcing (EPO) is derived from Knowledge Process Outsourcing (KPO), a term coined by Kiran Karnik, the President of NASSCOM (the National Association of Services and Software Companies). EPO is already a booming business in the United States and US-based education companies such as the Princeton Review, Kaplan and Sylvan have seen a boom in their business. Now it is getting too much for them to handle and they think that they can outsource it economically to Indian companies. The private sector in Indian various Indian institutions such as MAHE, BITS, Central Institute of English & Foreign Languages have set up overseas campuses and franchises. Educomp and Datamatics are two prominent Delhi-based Indian companies, which are into online –tutoring. EPO promises many jobs for Indian teachers as they are able to adapt quickly to the changing scenario. BPOs required people with good English speaking skills and they are in abundance in a country like India, and this has made India such a big success in this field. Similarly because there is no dearth of knowledge workers who have scientific brainpower and with world's second largest English speaking country after America, India has the potential to be a global hub for exporting education services. In order to reverse the trade of functioning as most EPOs are controlled by transnationals, we need homegrown EPOs targeting Indian and international students.

5.2 Critics of e-Learning :

We are living in an era of liberalization, privatization and globalization and (General Agreement on Trade in Services) GATS has had a considerable impact on the service industry in India and it has its implications for the education sector including the e-learning industry in India. Those in favour of GATS stress that education is primarily a government function and that the agreement does not seek to displace the public education system. Nevertheless, according to critics education is not a commodity and the very question of protection of public services is quite uncertain because the phrase 'governmental authority' could not be conclusively defined.

Numerous social scientists agree to the notion that we are living in the Information

Age. However there are some who have serious doubts about even the validity of the notion of an 'information society' (Webster, 1997). Many hold the opinion that education is being uselessly touted as having great potential over the web especially in a country like India where infrastructure is a much talked about problem, the internet penetration ratio is very much less compared to developed countries and the literacy rate dismal. Even the definition of literacy in our country is not very reliable with it meaning ability to read and write simple words, which is acquired with or without formal schooling.

They say that India is a country where the basic elements of infrastructure including quality education, healthcare, electricity and drinking water for the common man remain in short supply. According to them, first the basic needs of the citizens should be met by spending heavily on infrastructure building before leapfrogging directly into a knowledge economy. This however doesn't imply that we should cease all the developmental works be it in all spheres like e-learning and the like.

Institutes and organizations in India like BITS Pilani, NMIMS Mumbai, Visvesvaraya Technological University, HECL, Sikkim Manipal University let aside the private companies like NIIT etc. have amply demonstrated that e-learning is inevitable even in a country like India in the times to come.

5.3 Lessons to be Learnt :

Recently, one of the Indian universities, Visvesvaraya Technological University offering online distance education was in the news for the wrong reasons. The 'bucket theory' or the banking concept of education, which assumes that the instructor owns the knowledge and deposits, it into the passive students who attend the class came into the picture with the teachers prohibiting the students from using EDUSAT. Fears among the teachers have cropped up that online distance education would put an end to their careers but they do not realize that e-learning is merely a tool to complement traditional teaching and it can provide 24/7 services to the students which are otherwise

impossible for them. Others have a question in their mind regarding the fate of the human aspect of teaching and perceive e-learning as a threat. But their fears and questions are well addressed by Bill Gates who said, "There is an often-expressed fear that technology will replace teachers. I can say emphatically and unequivocally, IT WON'T. The information highway won't replace or devalue any of the human educational talent needed for the challenges ahead. However, technology will be pivotal in the future role of teachers" (Bill Gates).

Change is a painful process be it in any organization and it is therefore resisted by most organizations but the need of the hour is effective change management by the leaders of the higher educational institutes which are into e-learning. "Management without proper leadership is treacherous. One has to do with effectiveness (…) the other with efficiency. (…) It takes both to succeed" (Schneider, 2003). Higher educational institutions in India which plan to venture into e-learning should take a lesson from this and are suggested to first follow the education and communication strategy of organizational change where the stakeholders should be informed as to how the change will affect them. This should be ideally be followed by the participation and involvement strategy and the teachers should be encouraged to participate in the change process so that they can act as a change agent later on facilitating the implementation of e-learning.

As far as state-run traditional universities in India are concerned, the deployment of ICT into education is minimal or being done in a haphazard, rigid and a crude manner. According to re-engineering gurus Hammer and Champy the traditional, residential institution of higher education is generally characterized by fragmentation in processes, stifled innovation, inflexibility, unresponsiveness, and is focused on activity rather than results (Hammer & Champy, 1993). Most state-run universities in India require an IT / ICT policy of their own.

Many universities are running international distance education centers and IGNOU is the prime example of blended learning which may be used as a benchmark

by the distance learning institutes in India. The scenario is changing and postgraduate studies at the Delhi University, one of India's largest university are just a click away with Delhi University having launched its library portal recently http://crl.du.ac.in having an electronic database on each subject, with each database having at least 51,000 documents. Jawaharlal Nehru University, is unquestionably one of India's most reputed universities and has computerized most of its books in the library with the only ones that remain to be digitized being the foreign books.

However in the case of some of the state-run universities, meetings are held where the decision makers talk about the long IT project gestation period, inadequate funds from the state etc. and ponder on how to make the best use of the power of IT / ICT for their respective universities. In fact longer IT project gestation periods are on account of ineffective IT project management. A well set out policy needs to be explicitly defined for requirements to be achieved in the long run as well as to be defined to manage their ongoing IT projects. This is a much needed step and the call of the hour is to formulate an explicit policy and communicate to the bottom-most rung of the IS (Information Systems) / IT personnel so that each can have a defined role of action. If decision makers argue on the efficacy of e-learning, lessons could be learnt from all the above positive developments happening in India striving for concerted efforts to provide 24/7 quality education to the student community.

5.4 Areas for Improvement :

On one hand India has emerged as a key player in the knowledge economy in the new world economic order, but on the other hand, India has the largest number of illiterates. In the present digital age this divide needs to be addressed as swiftly as possible. According to the census of 2001 in India, the literacy level was reported at 65.38%. with the number of literates in urban India being 80.30% and the percentage of literates in rural India being 59.40%. Another alarming statistic is the

number of dropouts, a fundamental concern that needs to be addressed. The number of children taking up primary education is approximately 23 million children per year but only about 15 million children per year take up secondary education. Dreze & Sen (1995, p.2), say that there are many areas of economic and social development in which India's achievements have been quite creditable. But there is one field in which India clearly has done worse than even the average of the poorest countries in the world and that is in elementary education. As per the NASSCOM 2005 report, the percent of student-age population attending a university is a mere 7 percent, which is obviously disturbing for a country aspiring to be a developed nation and this has serious repercussions for e-learning too. Currently, India is spending 4% of its Gross National Product (GNP) on education. The Central Advisory Board of Education (CABE) Committee on Financing of Higher and Technical Education headed by Planning Commission member Bhalchandra Mungekar has made a recommendation that if the total allocation for education is raised to the elusive six per cent of the Gross National Product (GNP) from the current four per cent, then higher and technical education should get at least 1.5 per cent of the GNP. Secondly, the internet penetration ratio in India is very much less as compared to the developed countries and is a major concern. The Internet World Stats: Usage and Population Statistics http://www.internetworldstats.com - a data warehouse on the Internet - places the number of Internet users in India in September 2006 at 60 million and the Internet penetration of the population in India amounts to 5.4 per cent. September 2006 at 60 million and the Internet penetration of the population of India accounts to 5.4 percent. AICTE realizing the importance of Internet started providing Internet connectivity under the AICTE-ERNET Scheme to the affiliated Technical Institutions. The Knowledge Commission created under the chairmanship of Sam Pitroda, which is focusing on key areas like education and e-governance is now already

grappling with the problem of overcoming the digital divide. Efforts are being made to create a large enough telecommunication network to facilitate the flow of information, which will help in addressing many of our developmental needs including the need of human capital formation and even e-learning. The results are showing up and now India is witnessing a leapfrogging effect with people having no telephones moving directly to mobile phones, skipping the stage of landline telephones altogether. Anna University, a university in South India is planning of venturing into m-learning keeping in view the staggering growth of the number of people having mobile phones. Hewlett Packard has announced a grant of approximately $70000 which would help Anna University to establish a mobile learning (m-learning) centre where students taking Computer Science and IT courses can access content using hand-held computers. Work is being done by other organizations too which are pooling in their efforts and have come to the rescue of the government. We need to promote e-literacy in India because the success of e-learning depends heavily on that. The contribution of the *Sarva Siksha Abhiyans* (SSA) cannot be negated and a major initiative under SSAs is Headstart, which is a initiative in CAL (Computer Aided Learning) launched in Madhya Pradesh. Some of the initiatives in CAL under SSA which have been taken up in Orissa and Assam have enjoyed limited success. The IT Department, State Govt. of Kerala has launched *Akshaya* , a project for promoting basic computer literacy which is helping in bridging the digital divide. We need more such projects aimed at the general public for promoting digital literacy. A three day global IT summit 'Air Jaldi' http://summit.airjaldi.com got underway on October 23rd at Dharamshala sponsored by the Tibetan Technology Center having participants from the USA, the UK, Denmark, Holland, Finland, Germany, and India, and which focuses on enhancing the quality of education, governance and healthcare using wireless networks.

Despite its unprecedented technology growth, India faces daunting challenges in the provision of equitable, quality education that prepares its youth for participation in this Digital Age. For the vast majority of children from economically disadvantaged communities, the barriers for access to quality education and hence participation in the global knowledge economy are very high. Of the nearly one million public schools in India, less than 0.2% have any form of IT infrastructure or computer-based education. Even in the schools with technology resources, computer education primarily focuses on teaching 'computers' as a subject rather than as a tool for enhancing the quality of teaching and learning in classrooms, which needs to be looked at.

"Although the use of ICT in education and teacher training will grow more rapidly than expected, traditional technologies will continue to exist alongside the newer ones. This is because of the tremendous amount of funds it would take to bridge the digital divide. Concerted efforts of international organizations and governments will however make significant progress in bridging the chasm" (Cabanatan, 2001).

6. CONCLUSION :

No doubt there are certain areas which need to be worked upon for the successful implementation of e-learning and traditional institutions offering higher education in India should give it a thought. They need to become more customer-centered and take a lesson from businesses which regard customer to be the king. Focusing on blended learning, rather than insisting on teaching students at my place at my pace using an industrial model that is now becoming obsolete is what they need to look at. Universities need to leverage their competitive advantage in terms of the ICT revolution and the new model of e-learning must be relied upon in the future.

Peter Drucker made a sensational statement in 1997 that: "Thirty years from now the big university campuses will be relics. Universities won't survive … It's as large a change as when we first got the printed book*"* so that higher educational institutions shake off their inertia and utilize

ICT to its best. This evoked a response from higher educational institutions in the western world, which realized the potential of ICT and started offering online education. The Indian institutes of higher education should also critically appraise what he meant to say and think of making the best use of ICT for their respective institutions.

The key to successful reach of e-learning for the 'have-nots' is by providing access to open-source quality content. This could be facilitated by providing a universal platform (with options of vernacular languages) for hosting of SCORM (Shareable Content Object Reference Model) compliant quality courseware and learning materials to be uploaded by willing subject experts. The subject and module-wise categorization could be placed on a homepage. Each learning material needs to be dynamically repositioned in accordance to the rating given by the user community. Government intervention in such a initiative would go a long way in promoting the sharing of quality knowledge resources across platforms amongst user communities. Emerging educational technologies, particularly those in the area of ICTs (Information and Communication Technologies) are providing new ways of educating, training and learning to supplement and complement education resources to meet the challenges of the 21st century. Introducing a well-coordinated ICT program in teaching institutions should go beyond providing computers and content. Education models that are innovative, cost-effective, scalable and sustainable are required to inspire students and persuade parents and communities, and engage governments for the long-term.

Meeting citizen's basic needs such as quality education complemented by more initiatives in the field of e-learning and its adoption by the traditional institutions of higher education will a move which will prove to be like glistening sunshine for India's knowledge economy.

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