Challenges and Prospects of 'ICT' in Socio-Economic Growth in Higher Learning Institutions of India

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ABSTRACT

The application of Information and Communication Technologies (ICTs) is already changing the organization and delivery of higher education. The pedagogical and socio-economic forces that have driven the higher learning institutions to adopt and incorporate ICTs in teaching and learning include greater information access; greater communication; synchronous and asynchronous learning; increased cooperation and collaboration, cost-effectiveness and pedagogical improvement. However, ICTs have not permeated to a great extent in many higher learning institutions in most developing countries due to many socio-economic and technological circumstances. This paper discusses new learning and training technologies considering their pedagogical, cost and technical implications. It also discusses challenges for integrating these technologies in higher learning institutions with examples from India, and giving best practice approaches for addressing each of the challenges.

Keywords: *Information and Communication Technology, e-learning, teaching and learning technologies, higher learning institutions, developing countries, Web based technologies*

INTRODUCTION

Developments in Information and Communication Technologies (ICTs) have impacted all sectors of society, including the education sector. In higher education, application of ICTs in form of elearning is already changing teaching and learning processes. There are many pedagogical 1 and socio-economic factors that have driven higher learning institutions to adopt e-learning. These include greater information access; greater communication via electronic facilities; synchronous learning; increased cooperation and collaboration, cost-effectiveness (e.g. by reaching different students and in greater numbers) and pedagogical improvement through

simulations, virtual experiences, and graphic representations. Both trainers and learners can choose more appropriate applications which are flexible in time, in place, personalized, reusable, adapted to specific domains and more cost-efficient (Fisser, 2001; Pelliccione, 2001). On the other hand, there are a number of challenges that face universities in developing countries as they seek to implement the e-learning systems. AAU (2001) asserts that African universities which should be in the forefront of ensuring Africa's participation in the ICT revolution, they are themselves unable and ill-prepared to play such a leadership role. This is because of the information infrastructure of African universities which is poorly developed and inequitably distributed. This paper discusses the application of ICTs in teaching and learning by reviewing the e-learning context, and then focuses on the pedagogical, cost and technical implications of different ICTs that can be used for e-learning purposes. Few examples are also picked from some universities in India. Challenges for integrating these technologies in higher learning institutions in developing countries are discussed, giving best practice approaches for addressing each of the challenges.

E-LEARNING IN CONTEXT

E-learning refers to the use of ICTs to enhance and support teaching and learning processes. It is the instructional content or learning experiences delivered or enabled by electronic technologies and it incorporates a wide variety of learning strategies and technologies. E-learning ranges from the way students use e-mail and accessing course work online while following a course on campus to programmes offered entirely online (Commission on Technology and Adult Learning, 2001; OECD 2005). It is thus an alternative solution, which enlarges accessibility to training and becomes essential to complement the traditional way of teaching (i.e. face-to-face). E-learning encompasses a continuum of integrated educational technologies. At one end are applications like PowerPoint, which have little impact on learning and teaching strategies or the organization. At the other end are virtual learning environments (VLEs), and managed learning environments (MLEs), which can have significant impact upon learning and teaching strategies, and upon the organization (OSU, 2003; Julian et al, 2004). Broadly, OSU (2003) views the continuum of e-learning as the educational technology from the supplemental use of technology in the classroom, through blended or hybrid uses comprising a mix of face-to-face and fully online instruction, to fully online synchronous and asynchronous distance learning environments

delivered to remote learners. In the supplemental use of ICTs to complement traditional learning experiences, the instructor teaches all sessions in the classroom but with the occasional use of technology, such as Webbased activities, multimedia simulations, virtual labs, and/or online testing (Arabasz and Baker, 2003). Blended learning denotes a solution that combines several different delivery methods, such as collaboration software, web-based courses, computer communication practices with traditional with traditional face-to-face instructions (Mortera-Gutierrez 2005). On the other hand, distance learning is conducted solely online where interaction may be synchronous or asynchronous (OSU, 2007). Synchronous learning requires the teachers and students to interact at the same time though they may be dispersed geographically. On the other hand, asynchronous learning allows teachers and students to interact and participate in the educational process at different time irrespective of their locations (Chen et al., 2004). Actually, the use of synchronous with asynchronous activities is determined by the available technology, cost, and maintenance and is adjusted to suit each course, instructor and audience (Graziadei et al., 1997).

E-LEARNING TECHNOLOGIES

Functionally, e-learning includes a wide variety of learning strategies and ICT applications for exchanging information and gaining knowledge. Such ICT applications include television and radio; Compact Discs (CDs) and Digital Versatile Discs (DVDs); video conferencing; mobile technologies; web-based technologies; and electronic learning platforms. This section discusses what these ICTs entail and their pedagogical, technical and cost implications. Television (TV) refers to a receiver that displays visual images of stationary or moving objects both live or pre-recorded and mostly accompanied by sound which is electronically captured, processed and re-displayed. Likewise, this applies to the term radio – both live generated sound as well as pre-recorded sound. Both TV and radio can improve teaching and learning process in different ways such as by showing processes and activities that may not otherwise be available to the learner. However, digitalization has taken over analog audio and video systems. Compact Discs (CDs) and Digital Versatile Discs (DVDs) are based upon laser technologies for writing and reading data. They provide a way in which a large amount of multimedia training material can be stored and made available to end-users: CD-ROM can store up to 1GB while DVD can store up to 17 GB. CD-ROM and DVD-based products can be linked with online information sources. This

hybrid approach provides the user with access to media-rich up-to-date information. Video conferencing is a system where two or more participants, based in different physical locations, can see and hear each other in real time (i.e. live) using special equipment. It is a method of performing interactive video communications over a regular high-speed Internet connection. A videoconference can be either two-way (point-to-point) or multipoint, linking three or more sites with sound and video. It can also include data sharing such as an electronic whiteboard where participants can draw on, or text based real time 'chat'. Interactive whiteboard is simply a surface onto which a computer screen can be displayed, via a projector (Department for Education and Skill, 2004). Mobile e-Learning (sometimes called 'm-Learning') is a new way to learn using small, portable computers such as personal digital assistants (PDAs), handheld computers, two-way messaging pagers, Internet-enabled cell phones, as well as hybrid devices that combine two or more of these devices into one (Hunsinger, 2005). These technologies have enormous potential as learning tools. World Wide Web (WWW) is set of software tools and standards that allow users to obtain and distribute information stored on a server and connected to Internet. WWW is a decentralized information system, in which anyone can add new information whenever he/she wants. Lecture notes and other teaching materials are placed on the WWW and linking useful websites to these resources for students to access. In the recent years, web and Internet technologies have matured significantly by providing a uniform access media for both asynchronous and synchronous learning. This phenomenon has significantly increased the popularity of on-line learning (Chen et al., 2004). The usage of web technologies in e-learning are further enhanced with the web 2.0, which is a set of economic, social, and technology trends that facilitate a more socially connected Web where everyone is able to add to and edit the information space (Anderson, 2007). These include blogs, wikis, multimedia sharing services, content syndication, podcasting and content tagging services (Anderson, 2007). E-learning platforms (sometimes called learning management systems (LMS)) are applications used for delivery of learning content and facilitation of learning process. They are developed for administration and teaching in tertiary education. This software enables the administrators and lecturers to treat enrolment data electronically, offer electronic access to course materials and carry out assessments (OECD, 2005). The activities managed by the LMS vary from instructor led classroom training to educational seminars to Web-based online training. In addition to managing the administrative functions of online learning, some systems helps create, reuse,

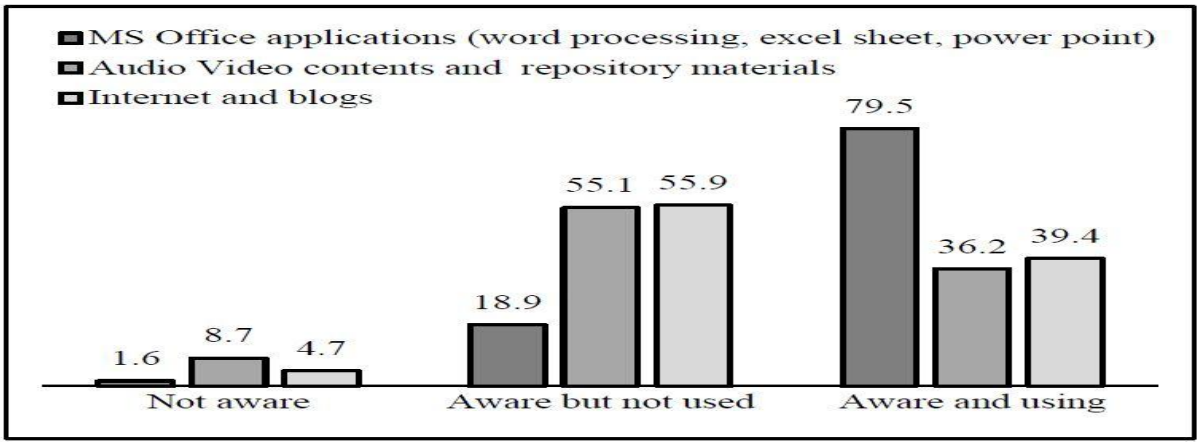
locate, deliver, manage, and improve learning content. These systems are called Learning Content Management Systems (LCMS) (Rengarajan, 2001). LCMS actually provide tools to deliver instructor-led synchronous and asynchronous online training. The LCMS provides tools for authoring content as well as virtual spaces for learner interaction (such as discussion forums and live chat rooms). Rengarajan (2001) emphasizes the importance of integrating both LMS and LCMS because they share different levels of administrative interests in the same entities. Lack of smooth integration between the products results in a broken solution with administrative conflicts. Many e-learning platforms (both LMS and LCMS) currently available are based on either proprietary e-learning software (PES) or open source e-learning software (OSS). OSS usage in implementing e-learning systems is more emphasized in developing world due to the challenges faced when implementing the PES. Coppola (2005) describes two characteristics of PES that make it ill-suited: (1) the rapidly escalating cost of proprietary software leaves too little of an institution's ICT budget available for creative exploration, once the software has been installed and minimally supported; (2) reduced flexibility to adapt to institutional culture, teaching practices, and disciplinary uniqueness occurs when software development is driven by mass market economics. Open source software offers the potential to reduce the cost of the software while providing the universities greater control over its destiny. Elimination or reduction of license leaves more budgets available to invest in adapting and managing the software; offers reliability, performance and security over proprietary software due to the availability of the source code, which allows vulnerabilities to be identified and resolved by third parties and it is easy to customize (Wheeler 2003; Coppola, 2005). Some of the widely used open-source e-learning software programs are the Claroline and Moodle

PEDAGOGICAL, TECHNICAL AND COST IMPLICATIONS OF E-LEARNING TECHNOLOGIES

E-LEARNING TECHNOLOGIES	PEDAGOGICAL IMPLICATIONS	TECHNICAL IMPLICATIONS	COST IMPLICATIONS
TV/Radio	Effective use of TV/radio depends on three key moments in the application: before, during and after the viewing session and give instructions, explanations, questions or evaluation before and after each moment	Equipments are needed depending on the objectives and the scope of the training application, which includes audiocassette, video camera, PCs, editing software, distribution channel and receiving and displaying equipment.	Costly in terms of TV/radio production, which includes, animation and graphic designers, hardware, access to the broadcast network
CD/DVD/ Pen drive	Simulation for selfstudy • Used with the presence or remote support of the traine	Hardware that meets their specifications - graphic screens, MPEG2 cards, CD or DVD reader and appropriate software	Costs are higher than for printed materials - replication downloading free products or buying ready-made products can lower the costs
Web-based technologies	Permanent accessibility (24 hours, all days of the week), speed, direct communication, links to related topics and up-to-date notes.	Fast computers with sound cards and reliable Internet connection are required. • The following team is needed for implementing web-based training: (a)	Hardware, technical expertise and Internet subscriptions costs

ICT AWARENESS AND USAGE IN TEACHING AND LEARNING

Awareness and usage of ICT for Teaching and Learning	Not aware	Aware but not used	Aware and using
MS Office applications (word processing, excel sheet, power point)	1.6	18.9	79.5
Audio Video contents and repository materials	8.7	55.1	36.2
Internet and blogs	4.7	55.9	39.4



E-LEARNING AT HIGHER LEARNING INSTITUTIONS IN INDIA

India is the largest democracy with remarkable diversity among its population of more than 1.2 billion which makes up about 17% of the world‘s population. Almost 70% of Indian population is rural. The adult literacy rate stands at about 60% and this is significantly lower in women and minorities. Education in India comprises of government, government aided and private institutions, of which nearly 40% are government. With the population growth rate of approximately 1.5%, there is tremendous pressure on the education system to provide quality education at affordable price and improve the literacy rate. (Upadhyay Ajay; 2009).

India has one of the largest education systems in the world. A typical Indian student is introduced to formal education at the age of five. The Right to Education (RTE) Act provides free and compulsory education for all children in the age group of six to fourteen years as a fundamental right. According to the statistics published by University Grants Commission in

2012, India is host to 6599 universities (45 central, 312 state, 173 private, and 129 ―deemed to be‖ universities) and over 33,023 colleges. The distance education system contributed a quarter of student enrolments in the higher education system, with over 20 million students enrolled in the Indian Higher Education systems. The Education system has been changing from Vedic education system to today‘s ICT enabled education. With increase in population and with change of technology, the entire education system is also changing. As per working paper no 179, (MAY 2006), higher education in India: Seizing the Opportunity; KaulSanat, over the last 50 years, the Government of India has provided full policy support and substantial public funds to create one of the world‘s largest systems of higher education. These institutions, with the exception of some notable ones, have however, not been able to maintain the high standards of education or keep pace with developments in the fields especially in 23 knowledge and technology. Over time, financial constraints with exploding enrolments and a very high demand from primary and secondary education, has led to the deterioration in the financial support provided by the government. On top of this, an overall structure of myriad controls with a rigid bureaucracy has stifled its development. In terms of higher education, however, on the science and technology side, India has however built up the largest stock of scientists, engineers and technicians. Jaiswal Vijay (2013), in his publication ―Current Status of e-Learning in Indian Higher Education: A Case Study of U.P.‖ stated that Integration of ICTs into education at all levels has been a defining feature of education all over the world in recent years. In a rapidly changing world of global market competition, automation and increasing democratization, education must contribute to an individual‘s capacity to access and apply information in the proper context. At the national level IGNOU, NCERT, CEC, DST etc. are major users of EDUSAT network for distance education, school education, higher education and science education respectively. The rapid pace of technological change offers hope that education in India can leapfrog into the new era of global knowledge at considerably less cost than the developed, industrialized countries have experienced. National Mission on Education through Information and Communication Technology(NMEICT) has been envisaged to leverage the potential of ICT in providing high quality personalized and interactive knowledge modules over the internet/intranet for all the learners in Higher Education Institution in anytime, anywhere mode. It also plans to focus on appropriate pedagogy for eLearning, providing facility of performing experiments through virtual laboratories, on-line testing and certification, on-line availability of teachers to guide and

mentor learners, utilization of Direct to Home (DTH) platforms, 24 training and empowerment of teachers to effectively use the technology integrated methods of teaching etc. (Government of India, Ministry of Human Resource Development, Annual Report 13-14) As per data provided by planning commission of India through www.data.gov.in, there has been a considerable increase of educational institutes as exhibited below:

TYPE OF INSTITUTION	YEAR 07-08	YEAR 11-12	INCREASE
Central Universities	19	42	23
Indian Institute of Technology	**07**	**15**	**08**
Indian Institute of Management	**04**	**11**	**07**
Indian Institute of Science, Education and Research	**02**	**05**	**03**
School of Planning and Architecture	**01**	**03**	**02**
National Institute of Technology	**20**	**30**	**10**
Others	**05**	**06**	**01**
Total	**58**	**112**	**54**

Despite the presence of more than 1,400,000 schools and over 3,500 diploma/degree awarding (or higher education) institutions across the country, India still lacks infrastructure in its conventional education system to serve a growing population. Distance and e-Learning programs are potential, seemingly obvious solutions to this problem. The Indian constitutions have now provided education as a fundamental right to every citizen of the country. Access, reach and quality of education are still a mystery. The benign concept of Right to Education and unreached quality of 25 education could be achieved through the e-Learning. It is also important for skill and professional training to the mass. Catering to the large industrial work force need is also a challenge which could be met through this new mode educational delivery system. In recent years, the Indian government has invested a great amount of money and has put considerable

effort into providing quality education and promoting new technologies to all citizens. e-Learning access is mainly depending on internet and broadband access. India has already launched wireless broadband based on 3G and the teledensity is increasing rapidly. As per TRAI the number of Internet subscribers increased from 0.95 million in March 2000 to 22.39 million in December 2011, grown at a CAGR of 33.3 per cent. As of December 2011, this comprises of 13.35 million broadband (>=256 kbps) connections and 9.08 million narrowband Despite such impressive growth, the share of Internet users remains a negligible fraction of India‘s total population. Lack of accessibility, lack of information, lack of literacy, inconsistent power supply, and high maintenance cost of personal computers (PCs) are some of the major reasons for this phenomenon. This implies that mobile Internet access may have a substantial impact on Internet users in the country. Mobile broadband is getting increasingly popular in India similar to China, especially accessing broadband over the mobile phone. There were 431.37 million wireless subscribers in India who had subscribed to data services as of December 20111 . This implies that 48.26 per cent of total wireless subscribers were capable of accessing data services/Internet at the end of December 2011. The number of wireless subscribers who have subscribed to data services has increased at the CAGR of 93.1 per cent between March 2007 and December 2011. This growth rate is much higher than the growth in traditional Internet subscribers. Broadband subscription is 59.6 per cent of total Internet subscription as of December 2011. Dial-up is the most popular narrowband technology with 24.2 per cent of total Internet connections. It clearly indicates that future prospects of e-Learning in India are very good. e-Learning is one of the thrust areas identified by the Indian government. MHRD have taken steps by permitting opening of new courses in technical institutions and providing concession to IT industry. The Department of Information Technology (DIT) is involved in the development and promotion of Information Technology and Electronics in the country. The main thrust of the e-Learning programme is to effectively integrate eLearning methodology and approach with the conventional classroom system to maximize the benefits flowing from the traditional education system, increase its reach to more and more learners and spread e-learning from teaching of IT related subjects to other subjects. After recommendation of National Task Force on IT and 10th Plan Working Group, DIT had initiated development projects leading academic and R&D institutions in the area of e-learning.

VARIOUS INITIATIVES TAKEN BY GOVERNMENT OF INDIA

National Resource Centre for On-Line Learning: C-DAC, Mumbai:- Under the project a comprehensive portal for on-line learning has been set up and is accessible at http://www.ncst.ernet.in/~vidyakash. The 27 portal covers institutions, standards, on-line content, resource material (articles, papers, tutorials, etc), tools and development environment. The portal contains over 400 links. 2. Virtual Campus Initiative: IGNOU, New Delhi:- The PG Diploma Courses were launched under the project at IGNOU, New Delhi. 3. Developing Web based Digitized Collection for Distance & Continuing Education in Information Technology (IT) A Demonstrative Project on the Internet Based Online Interactive Courseware: IIT, Delhi 4. India's 1st Virtual University - a multi-modal e-learning system developed at the Birla Institute of Technology and Science, Pilani (BITS). This is CBT and Web-based E-learning systems developed in collaboration with IBM India, Distance Education Council (GoI), Ministry of Information Technology(GoI), CISCO Systems (USA) and Oxford University (UK). BITS used Web-based Learning over the Internet, Video-on- Demand over IP, Virtual Digital Library and WAP enabled Device Support for select e-Learning Services in helping the registered students 5. Development of Interactive Multimedia Information Services over a Hybrid Internet and Broadcast Digital TV Networks: IIT, Kanpur 6. Developing Web based Intelligent Interactive Tutoring (WebIIT): IIT, Delhi 7. Design and Development of Component Based Functionality to elearning tools: C-DAC, Hyderabad 8. Multimedia Digital Distance Education for IT & Other Critical Technologies: School of Education Technology, Jadavpur University National knowledge commission has also shown its concern for implementation of ICT based educational projects. The country has already initiated massive projects to explore the potential of e-Learning.

Government initiatives taken to promote e-Learning is given below:

Government Initiative	NPTEL
	Virtual Labs
	Talk to a Teacher
	Spoken Tutorial
	Consortium for Educational Communication
	Digital Library Inflibnet
	Quantum-Nano Centre
	ERP Mission Brihaspati
	ISLERS
	OSCAR
	FOSSEE
	e-Kalpa
	Robotics for Education
	Pedagogy Project
	Virtual Learning Environment
	Text Transcription
	OSS for Maths Edu
	SOS Tool
	Integrated National Knowledge Network (iNKN)
	IGNOU e-Learning initiatives
	NMEICT
	Sakshat Portal
	IIITM-K Initiatives
	EDUSAT (Educational Satellite)
	VTU e-Learning Framework
	Initiatives taken by Jadavpur University
	Initiatives taken by Aligarh Muslim University
	Central Institute of English and Foreign Language, Hyderabad
	NIC e-Learning Portal (http://elearning.nic.in)
	MOOCs

Various projects which have been undertaken by Indian Government for implementation of e-Learning are described as follows:

1. **NPTEL (National Programme on Technology Enhanced Learning)** NPTEL provides E-learning through online Web and Video courses in Engineering, Science and humanities streams. The mission of NPTEL is to enhance the quality of Engineering education in the country by providing free online courseware.
2. **Virtual Labs**

- To provide remote-access to Labs in various disciplines of Science and Engineering. These Virtual Labs would cater to students at the undergraduate level, post graduate level as well as to research scholars. 34
- To enthuse students to conduct experiments by arousing their curiosity. This would help them in learning basic and advanced concepts through remote experimentation.
- To provide a complete Learning Management System around the Virtual Labs where the students can avail the various tools for learning, including additional web-resources, video-lectures, animated demonstrations and self evaluation.
- To share costly equipment and resources, which are otherwise available to limited number of users due to constraints on time and geographical distances.

3. **Talk to a Teacher**

A-VIEW is part of Talk to a Teacher program coordinated by IIT Bombay and is funded by the Ministry of Human Resource Development (MHRD) under the Indian Government‘s National Mission for Education using Information and Communication Technology (NME-ICT) along with various other projects in Virtual Labs, Haptics and Natural Language Processing.

A-VIEW is now deployed at several IITs, NITs and other leading educational institutions across the nation. A-VIEW (Amrita Virtual Interactive e-Learning World) is an award winning indigenously built multi-modal, multimedia e-learning platform that provides an immersive e-learning experience that is almost as good as a real classroom experience developed by Amrita e-Learning Research Lab. It is a part of Amrita VishwaVidhyapeetham,

one of the fastest growing institutions of higher learning in India and address the most pressing issue of higher education in India – the shortage of highly qualified teachers.

4. Spoken Tutorial

The Spoken Tutorial project is launched by Ministry of Human resource of India. The spoken Tutorial Project aims to make spoken tutorials on FOSS available in several Indian languages, for the learner to be able to learn in the language he/she is comfortable in. Its goal is to enable the use of spoken tutorials to teach in any Indian language, and to be taught to learners of all levels of expertise- Beginner, Intermediate or Advanced.

5. Consortium for Educational Communication

Annually Consortium for Educational Communication (CEC) organizes Video Competition and Prakriti. Prakriti is an annual film festival on environment, human rights & development. Video Competition is an annual competition meant to nurture within media centres and other educational institutes in the country. CEC regularly organize various capacity building programs, technical & production related trainings, workshops on issue concerning to media, web enabled learning, production strategies, administration & accounts etc. National & International conventions, conference in the field of education and communication are the main academic events organized by CEC.

6. Digital Library Inflibnet

The UGC-Infonet Digital Library Consortium was formally launched in December, 2003 by Honorable Late Dr. A. P. J. Abdul Kalam, The Consortium proved to be a recipe to university libraries which have been discontinuing subscription of scholarly journals because of "Serials Crisis". The term "serials crisis" refers to exponential and continuing increase in subscription cost of scholarly journals. The crisis is a result of rise in cost of journals much faster than the rate of inflation, increase in number of journals and the paucity of funds available to the libraries.

The Consortium provides current as well as archival access to more than 7500+ core and peer-reviewed journals and 10 bibliographic databases from 26 publishers and aggregators in different disciplines. The programme has been implemented in phased manner.

7. Quantum-Nano Centre

The Quantum-Nano Centre is a multidisciplinary centre at Dayalbagh Educational Institute, Agra set up under MHRD National Mission on Education through ICT, with partners including IIT Kanpur, IIT Delhi and IIT Madras, besides several international collaborators. With a focus on the rapidly growing area of quantum-nano computing and quantum information sciences, the Quantum-Nano Centre provides an environment for scientists and mathematicians to explore the fundamental physical characteristics of quantum systems, to devise and implement prototype quantum computers, and to develop quantum algorithms and novel applications. Through a vigorous program of lectures, seminars, and workshops, the Centre stimulates intellectual exchange among students, faculty, and academic partners.

8. ERP Mission Brihaspati

The software developed by IIT Kanpur. It is the open platform of learning. It is the java servlets based content delivery system. Administrator (admin) is the main authority of Brihaspati. The software is free of cost.

9. ISLERS

This project is aimed to develop an automatic Indian Sign Language education and recognition platform for hearing impaired students of India. The system can substantially help in the primary/vocational/higher education of hearing impaired students and people of India.

10. OSCAR

The main goal of Project OSCAR (Open Source Courseware Animations Repository) is to build a large repository of web-based, interactive animations and simulations, referred to as learning objects (LOs), for teaching and learning concepts in science and technology. These could be useful not only for a classroom environment but also for enabling independent learning and distance education.

11. FOSSEE

FOSSEE project is part of the National Mission on Education through ICT with the thrust area being "Adaptation and deployment of open source simulation packages equivalent to proprietary software, funded by MHRD, based at the Indian Institute of Technology Bombay (IITB). Activities undertaken in this area are:

1. Promoting the use of open source/free software through workshops and other publicity.

2. Creating educational content around existing open source softwares

3. Promoting the use of open source softwares in audio/video courses and virtual labs, the other thrust areas of this mission.

4. Creating documentation, books and courses in the area of open source software

5. To take necessary steps to include open source software in the syllabi of various universities.

12. e-Kalpa

This project on 'Creating Digital-learning Environment for Design' also called 'e-kalpa' is sponsored by the Ministry of Human Resources, Government of India as part of the National Mission in Education through Information and Communication Technology. This project presents three initiatives – providing digital online content for design, a social networking environment for design and higher learning and creating a digital resource database on design.

13. Robotics for Education

This work started with the funding received from MHRD under NMEICT for the project ―Robotics for Education‖. The main purpose of this project is to develop state-of-the-art robotic platforms which could be used for imparting robotic education to Indian students. We aim to develop platforms for research and development. Using open-technology and open-source platform is one of the main focus for our research.

14. Pedagogy Project

This project is an experiment to systematically design and develop learnercentric curricula, suitable for outcome-based learning for 4 year degree programs in six major engineering disciplines. This project is NOT, yet another attempt to develop content, although each

curriculum document is expected to include around 80 pages of course notes and 120-125 self assessment problems 41 and solutions. All development and review activities will be carried out collaboratively, using a specially designed web tool.

15. Virtual Learning Environment.

VLE, an online environment of e-resources caters to several disciplines taught at undergraduate and postgraduate level. It is an initiative of Institute of LifeLong Learning, University of Delhi. Conceived in 2012, VLE today boasts state of art material that addresses emerging needs of a diverse student body, not only of Delhi University but other universities as well. Drawing from several successful Moodle models, the multi-media interactive contents loaded on VLE are categorized discipline-wise.

16.Text Transcription

The main objective of ICT text transcription project is to create accurate text transcriptions of all NPTEL video lectures in engineering sciences from Phase I and other metadata for video indexing and searching.

17. OSS for Maths Edu

Project consists of organizing four workshops (5 days) for popularization of Open Source Mathematical Software at the National level in the educational field.The aim of the workshops will be to familiarize the participants to Mathematical Software for teaching and learning of Mathematics.

18. SOS Tools

Software and simulation packages are useful tools for the analysis of systems and solving problems by the students of Science, Social Science, Engineering, Management and related disciplines. Many commercial software packages are available for the above. But many of these software packages are quite costly and require yearly license fee for updates and maintenance.

The objective of this project is to develop software tools for analysis of systems and computations, create adequate manpower to teach students to use open source software and to

develop simulation tools. The developed software should be user friendly and properly documented.

19. Integrated National Knowledge Network (iNKN)

It was initiated to build a ―technology backbone‖ of the country. The main features of the iNKN projects are:- High Capacity, Highly Scalable Backbone Provide Quality of Service (QoS) and Security Wide Geographical Coverage Bandwidth from Many NLD's Highly Reliable & Available by Design Test beds (for various implementation) Dedicated and Owned. Connectivity for International & other global R&D Networks

20. IGNOU e-Learning initiatives

Indira Gandhi National Open University (IGNOU) provides multi-channel, multiple media teaching- learning packages in the form of self-instructional print and audio/video materials, radio and television broadcasts, face-to-face counseling/ tutoring, laboratory and hands on experience, video conferencing, interactive radio counseling, interactive multimedia CD ROM and internet based learning. IGNOU is pioneer organization for implementation of eLearning to cater its gigantic learner base across the country. It has launched several online programs.

Some of IGNOU e-Learning initiatives are mentioned below:

i) Egyankosh *ii) Educational Broadcast*
ii) iii) Online Programs *iv) Flexilearn*

21. National Mission on Education through Information and Communication Technology (NMEICT)

The Government of India has launched the National Mission on Education through Information & Communication Technology (NMEICT) to provide high quality, high definition interactive video courses & E-content for various under-graduate and post-graduate courses. Under the NMEICT connectivity is proposed to be provided to Universities and colleges which at present number 504 and 25000 respectively for the purpose.

22. Sakshat Portal

The Ministry of Human Resource Development has designed an education helpline named _Sakshat‘. It is perceived to be a single stop education portal for addressing the needs of students, scholars, teachers and life-long learners. It is a free portal launched by the Hon‘ble President of India on 30th October 2006. The website can be accessed at the following urls

http://www.sakshat.ac.in
http://sakshat.ignou.ac.in/sakshat/index.aspx
http://sakshat.gov.in

23. The Indian Institute of Information Technology and Management – Kerala

(IIITM-K) promotes higher education through its IT facilitated education programs and services. Among several activities, IIITM-K provides multimedia authoring and content generation facilities for the development of quality e-courseware, targeting higher education and professions.

24. EDUSAT (Educational Satellite)

Indian Space Research Organization has pioneered the use of front line space based communication technologies in the field of education and development. ISRO launched EDUSAT, a satellite meant exclusively for the education sector and the world's first satellite meant only for educational purposes on September 20, 2004.

25. VTU e-Learning Framework

In the proposed Visvesvaraya Technological University project (VTUEDUSAT), the network infrastructure will be used for the delivery of ―live‖ video-based lecture sessions. The subject experts use presentation content, which is derived from the deployed e-Learning content. Such video sessions would be captured, digitized and linked to become part of the overall eLearning content.

26. Initiatives taken by Jadavpur University

It started a new inter-disciplinary ―Masters in Multimedia Development‖ course in 2000-01 as a distance education course using print material, CD ROM, and web-based learning environment. Technology was provided by CDAC Kolkatta and CMC

27. Initiatives taken by Aligarh Muslim University

It worked on a project in 2006-07 to take its distance education program online, starting with a few courses which are industry-relevant.

28. Central Institute of English and Foreign Language, Hyderabad

It had a project for online learning software set-up and usage in 2006.

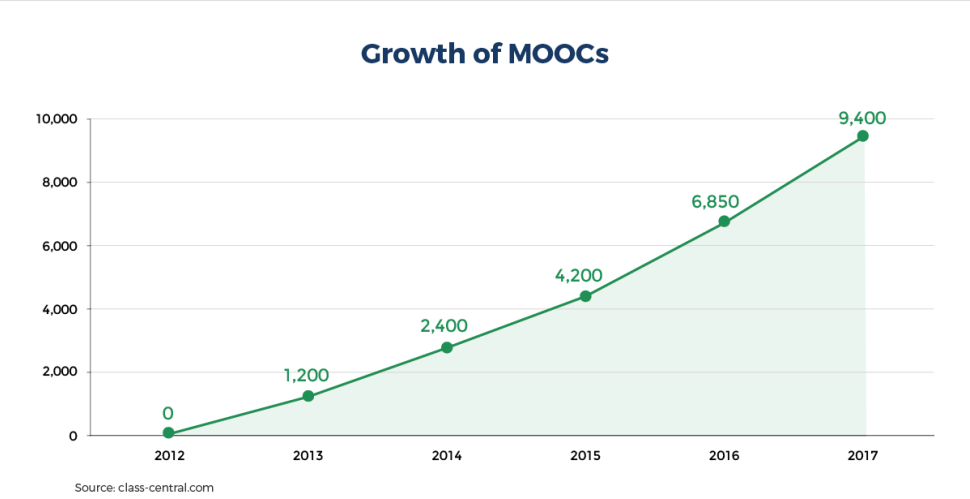
29. NIC e-Learning Portal (http://elearning.nic.in)

NIC is in the process of offering full-fledged e-learning, which utilizes various electronic media to fully or partially deliver trainings. It has the advantage of 48 allowing learners to monitor their pace and, in the same single window, have access to a repository on various latest technology areas.

30. Massive Online Open Courses (MOOCs)

India has recently announced its own MOOCs platform Swayam. Countries premier institutions have intended to offer courses on this platform. India is already the second biggest market (next to the United States) for MOOCs. The three top US-based MOOCs — Coursera, Udacity and EdX — now have a large proportion of Indian students.

MOOCs and blended learning programs figure prominently in the ―Higher Education in India: Vision 2030‖ prepared by Ernst and Young for the Government of India. One of its recommendations reads as follows: ―Promote continuing education for working professionals and introduce blended learning model using Massive Open Online Courses (MOOCs)‖.



INITIATIVE TAKEN BY VARIOUS NON-GOVERNMENT STAKEHOLDERS

Many private organizations are also involved in e-Learning projects like Brainvisa, Maximize Learning, Tata Interactive Systems, Hurix Systems Private Limited, Cosmos Learning Services Pvt. Ltd, GENPACT, Knowledge Horizon, Learning Mate, ClearPoint Learning Systems, Magic Software Enterprises India Pvt. Ltd, Magic Software, FCS (e-Learning), Excel-Soft Technologies, Sify Limited, Satyam, PULPMEDIA, Hurix Systems Private Limited, Educomp solutions Ltd, Axis-v Creatives Pvt Ltd, InfoPro India, Everonn Systems India, NIIT, Enyota learning, Harbinger Knowledge 49 Products, CHENNAI (DEVELOPMENT CENTRE), Zenith Global (elearning), Aptech, AnimGraphixPvt.Ltd, are showing keen interest in collaborative projects with educational organization for online distance education.

PRESENT AND FUTURE OF E-LEARNING IN INDIA

The Indian private sector has embarked on initiatives to provide e-learning courses. Several initiatives have already been taken by Indian Government to cater the educational need of vast population of the country through eLearning. Looking in to the e-Learning market of India private players has also invested huge funds in it. The National Institute of Information Technology (NIIT) set up Net Varsity in 1996. Amity University, India‘s largest private university has developed its own range of online degree programs that are currently priced around CAD 2,700 and are available in over 80 countries. In line with the recommendations of National Task Force on IT and 10th Plan Working Group, DIT had initiated development projects leading academic and R&D institutions in the area of e-Learning. Indian learners have

taken to MOOCs and other forms of e-learning in a big way. With well-established and highly prestigious domestic brands like Indian Institutes of Management and Indian Institutes of Technology introducing e-learning programs of their own or joining large global e-learning conglomerates, credibility issues around e-learning may become an outmoded concept within a short period of time. With the Government initiatives, e-governance as a whole and e-learning in particular is expected to take off in a big way. It is already promised to ―use technology to deliver low cost quality education to specially-abled students 'inhome' – through E-learning‖ and that it would ―set up Massive Open Online Courses (MOOC) and virtual classrooms to make it convenient for working class people and housewives to further their knowledge and qualifications‖

CONCLUSIONS AND RECOMMENDATIONS

ICTs provide great opportunity for universities in developing countries to improve their teaching and learning processes. So far most of the universities in developing countries possess basic ICT infrastructure such as Local Area Network (LAN), internet, computers, video, audio, CDs and DVDs, and mobile technology facilities that form the basis for the establishment of e-learning. It is argued that, universities in developing countries should adopt e-learning technologies to improve teaching and learning processes. Pedagogical, technical and cost issues should be taken into account for each specific technology when integrating ICTs in teaching and learning practices. Endnotes 1 The strategies, techniques, and approaches that trainers use to facilitate learning. 2 Moving Picture Experts Group. The standard for compression and storage of motion video, for example, videos available though the World Wide Web. 3 A society in which economic and cultural life is critically dependent on information and communications technologies.

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