

ICT: An Enabler and a Catalyst to Nurture Service Quality in Higher Education- A Review

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Abstract:

India has one of the largest higher education systems in the world, and has been witnessing healthy growth in its number of institutions and enrollment in the last few decades. The education system has seen a scorching growth over the last decade, trebling in size. In 2013, India had 727 universities, over 35,000 colleges and about 13,000 stand-alone institutions. Education is recognized as one of the critical elements of the national development effort and Higher education, in particular, is of vital importance for the nation, as it is a powerful tool to build knowledge-based society of the 21st century. India is developing as a knowledge economy and it cannot function without the support of Information Communication Technologies (ICT). Importance of education in almost all walks of life has increased with the support of ICT. During the past 20 years, the use of ICT has fundamentally changed the working of education. In the current environment-conscious world, the importance of education and acceptability of ICT as a social necessity has been increasing. We can make our learning more engaging with the use of ICT, it can completely change how our education system works. ICT can help in enhancing the quality of education through blended learning by supplementing the traditional talk and chalk method of teaching. ICT, if used creatively, can make a big difference in the way teachers teach and students learn and can help students acquire 21st century skills like digital literacy, innovative thinking, creativity, sound reasoning and effective communication. Role of ICT act as an enabler for quality and market-responsive in higher education. But, Higher education in India is plagued by the challenges of inadequate technology access and inequity coupled with economic considerations and technological know-how, it remains to be seen how ICT can actually burgeon the students and how it can foster change. In this aspect, the paper reviews certain important issues related with the effective implementation of ICTs in Higher Education and provides suggestions to address certain challenges that would help in the implementation of ICTs in Higher education and concurrently increasing the quality of education.

Key words: ICT, Higher Education, Service quality

I. INTRODUCTION

India has the third largest system of education in the world, next only to USA and China, with more than 500 universities and around 30000 colleges. During the last decade, higher education has gained importance in India's changing policy landscape as the government realizes that India's strength lies in education. India is developing as a knowledge economy and it cannot function without the support of ICT. To introduce ICT-enabled education in such a large system one needs to have high quality multi-media enriched content in different disciplines for various courses including its multilingual conversion, capacity building of teachers and students in ICT skills and state-of-the-art infrastructure along with networking and internet connectivity via Virtual Private Network (VPN) / broadband connectivity for disseminating the content and affordable access devices so that it reaches the doorsteps of the learners. The ongoing National Mission on Education through ICT (NMEICT) is a major initiative of the Govt. of India, in this direction with an aim to leverage the potential of ICT in providing high quality personalized and interactive content, free of cost, to all the learners. 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.

II. TRANSFORMATION IN HIGHER EDUCATION SECTOR

The Higher Education sector in India has witnessed a tremendous increase in its institutional capacity since Independence. At the time of Independence of India in 1947, there were only 20 Universities and 500 Colleges in the country with 210,000 students enrolled in higher education institutions. In the academic year 2011-2012 the numbers have increased to 659 universities, 33,023 colleges and 25.9 million students as shown in the table 1. India now ranks second in the world, in terms of enrollment of students after China; third being USA [2]. This tremendous increase was made possible mainly due to the large number of private institutions of higher education set up by the private sector. Currently more than 60 % of higher education institutions are private institutions in which nearly 60% of the total number of students is enrolled [2]. The Indian Government has set the ambitious target of increasing the current Gross Enrollment Ratio (GER) from 15% to 30% by 2020.

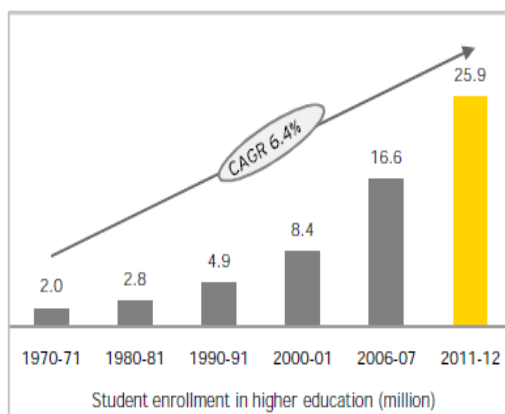
Table 1: Higher Education Sector

Higher Education Institutions	Academic year 2011-12
Universities	659
Central Universities	152
State Universities	316
Private Universities	191
Colleges	33,023
Central	669
State	13,024
Private	19,930

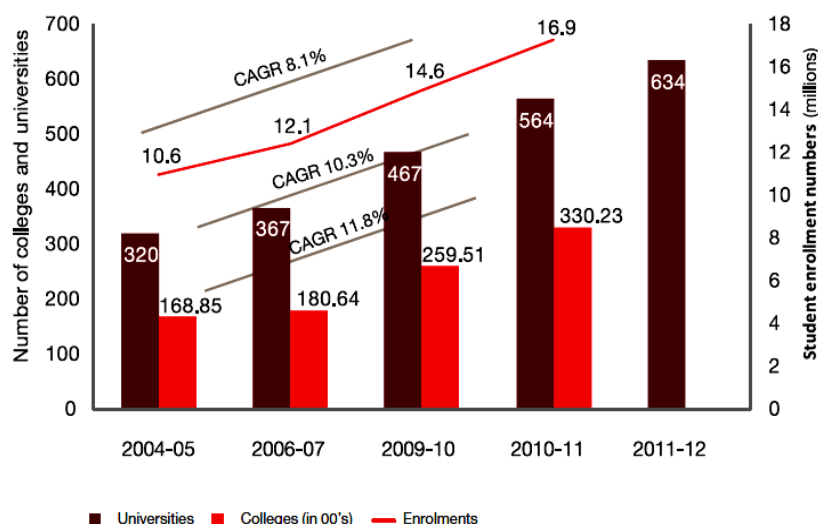
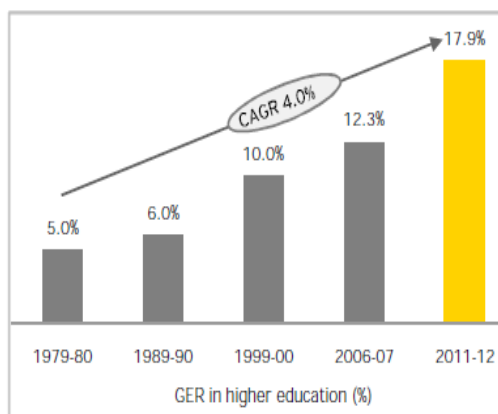
The table 1, indicates that the education system has seen a scorching growth over the last decade, trebling in size. In 2013, India had 727 universities, over 35,000 colleges and about 13,000 stand-alone institutions Education is recognized as one of the critical elements of the national development effort and Higher education, in particular, is of vital importance for the nation, as it is a powerful tool to build knowledge-based society of the 21st century. India is developing as a knowledge economy and it cannot function without the support of Information Communication Technologies (ICT).

III. GROWTH IN UNIVERSITIES, COLLEGES AND STUDENT ENROLMENT

Student enrollment in HEIs has grown 12 times in the last four decades



GER in higher education has reached close to 18% in 2011-12



Source :NMC Horizon Report2013

The gross enrolment ratio (GER) in higher education, as per the all India survey on higher education released by MHRD, stands at 18.8%. A comparison of the growth patterns of the rising number of universities and institutes on the one hand and the increasing student enrolments on the other indicates that the sector has attracted investments from both the public and private sectors. For instance, the number of institutes has nearly doubled from 16,800 to 33,000 at a CAGR of more than 11% between 2004-05 and 2011-12. The student enrolment numbers, during the same period, have also increased from 10.6 million to 16.9 million at a CAGR of 8%. However, despite a significant growth in enrolments,

the GER in higher education in India is still lower than the world average (24%), and much lower than that of developed nations (58%). Clearly, there is a long way to go to achieve the GER target set by the MHRD of 30% (by 2020)[2]. By 2030, India will be amongst the youngest nations in the world and the already existing challenges for Indian higher education – access, equity and quality – will only be greatly exacerbated unless we significantly transform our higher education model [2]. Today, the median age of India’s 1.5 billion strong population is a mere 32; a good ten years lower than most other nations in the world. Today, India is the largest contributor to the global workforce, its working age population surpassing 950 million. It is no surprise then that, India has emerged to be the world’s third largest economy – an achievement underpinned, no doubt, by its unique demographic advantage, but also a prospect that would not have translated into reality if not for the country’s pioneering reforms in university education over the past 20 years.

Over the last two decades, India has remarkably transformed its higher education landscape. It has created widespread access to low-cost high-quality university education for students of all levels. With well and a student-centric learning-driven model of education, India has not only bettered its enrolment numbers but has dramatically enhanced its learning outcomes.

IV. ROLE OF ICT IN HIGHER EDUCATION

According to Bush (McOmber, 1999), ‘technology is a form of human cultural activity that applies the principles of science and mechanics to the solution of problems. It includes the resources, tools, processes, personnel, and systems developed to perform tasks and create immediate particular, and personal and/or competitive advantages in a given ecological, economic, and social context’. ICT is defined as ‘any technology used to support information gathering, processing, distribution and use’ (Beckinsale and Ram, 2006). ICT refers to ‘Information’, ‘Communications’ and ‘Technology’. While most ICT-related studies have been obsessed with the ‘Technology’ component such as infrastructure, networks and connectivity, the ‘Information’ and ‘Communications’ components have been overshadowed despite their primary importance in this grouping. The technology component only comes to play because it has the potential to support and enable the preceding conditions of information and communications through a combination of technologies to disseminate knowledge. Underpinning these dynamics is the integral role of people as agents for ICT development, since technology is borne out of specific cultural contexts, time and place.

Information and Communication Technology (ICT) is basically an umbrella term that encompasses all communication technologies such as internet, wireless networks, cell phones, satellite communications, digital television etc. that provide access to information. The growth of information technology (IT) such as computers and the Internet continue to change our everyday life. In higher education, the implementation of information and communication technologies (ICTs) has become a necessary fashion all over the campus. During the past few decades, ICT has provided society with a vast array of new communication capabilities and has fundamentally changed the way we live now. We find a world of difference in the practices and procedures of various fields such as medicine, tourism, banking, business, engineering, etc. as they operate now in comparison to how they operated two decades ago. In contrast, the impact of ICT on education in India, however, has been far less and slow

The introduction of ICT into universities clearly changes the way education is conducted. ICT also paves way for a new pedagogical approach, where students are expected to play more active than before. ICT focuses on the crucial issues of how people communicate and learn in electronic environment. ICT in learning depends on effective communication of human knowledge, which may either occur in synchronous or asynchronous and blended learning situation as the case may be. The role of Information and Communications Technology (ICT) in human development has received growing attention among development practitioners, policy makers, government and civil society in recent years due to the growing proliferation of the Internet, convergence in IT and telecommunications technologies and increasing globalization. While issues of access and the adoption of new ICTs have tended to revolve around utopian themes of empowerment and the development potential of ICT, it has also raised the accompanying issue of digital divide and the challenges for developing countries to participate in the global information society[11]. ICT is viewed as a factor that can promote quality distance education. (Johnson, 2007) points out that communication is a fundamental act of the education process. Hence, to enhance quality in open and distance learning, proper attention must be given to information and communication technology. In education, ICT can be viewed as the application of digital equipment to all aspects of teaching and learning. It involves a combination of technologies for collecting, storing, processing, communicating and delivering of information related to teaching and learning processes.

TABLE 2 : FOUR MAIN RATIONALES FOR INTRODUCING ICT IN EDUCATION

Rationale	Basis
Social	Perceived role that technology now plays in society and the need for familiarizing students with technology.
Vocational	Preparing students for jobs that require skills in technology.
Catalytic	Utility of technology to improve performance and effectiveness in teaching, management and many other social activities.
Pedagogical	To utilize technology in enhancing learning, flexibility and efficiency in curriculum delivery.

Source : Cross and Adam (2007)

Importance of education in almost all walks of life has increased with the support of information and communication technologies (ICT). During the past 20 years, the use of ICT has fundamentally changed the working of education. The government is spending a lot of money on ICT in the higher education sector, the National Mission on Education is emphasizing on the role of ICT in increasing the enrolment ratio in higher education.

V. TECHNOLOGY ENABLED LEARNING INITIATIVES IN INDIAN HE SYSTEM

The Indian higher education system has undergone massive expansion to become the largest in the world enrolling over 70 million students. Such expansion would have been unimaginable without the extensive use of ICT tools. In short, technology has been nothing short of disruptive for Indian higher education, solving for three of India's pressing problems – access, equity and quality – at once. Government and educational institutions are looking for innovative ways to increase access to higher education and improve the quality of their programmes and courses in a bid to improve their competitiveness. Given the resource and physical constraints in expanding the conventional education infrastructure, the government is increasingly looking at technology as a means for expanding access as well as maintaining quality. While the positive impact of information and communication technology (ICT) in the areas of delivery and collaboration has been long established, higher educational institutes are increasingly experiencing the benefits of using IT tools for student and administrative management [5]. The various technology enabled learning initiatives taken by Government of India are discussed below:

NMEICT: The National Mission on Education through Information and Communication Technology (ICT) has been envisaged as a Centrally Sponsored Scheme to leverage the potential of ICT, in teaching and learning process for the benefit of all the learners in Higher Education Institutions in any time anywhere mode. The three cardinal principles of Education Policy viz., access, equity and quality could be served well by providing connectivity to all colleges and universities, providing low cost and affordable access-cum-computing devices to students and teachers and providing high quality e-content free of cost to all learners in the country. NMEICT encompasses all the three elements. The Mission has two major components:

- (a) providing connectivity, along with provision for access devices, to institutions and learners;
- (b) Content generation.

It plans to focus on appropriate pedagogy for e-learning, 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 available Education Satellite (EduSAT) and Direct to Home (DTH) platforms, training and empowerment of teachers to effectively use the new method of teaching learning etc.

SAKSHAT: It is envisaged as one stop education portal to facilitate lifelong learning of the students, teachers and those in employments or in pursuit of knowledge free of cost to them. The portal is expected to be the main delivery platform for the contents developed under the National Mission on Education through ICT (NMEICT).

Consortium of Educational Communication (CEC): CEC has been tasked for e-content generation. In phase-I, e-content for 19 UG subjects and in phase-II e-content for 68 subjects will be generated by the CEC in collaboration with its media centers. For 77 PG subjects, e-content generation activity has been assigned to University Grants Commission (UGC). The process of content creation has been initiated for 72 subjects.

Low Cost Access-cum-Computing Devices (LCAD): Even the best e-content cannot have a significant impact unless it reaches the vast majority of learners with ease, as and when they demand it. The Mission has funded the development of Ultra Low Cost Computing Devices to enable students, wherever they may be, access to education content. The advanced version of low cost tablet called Aakash-2 was launched on the occasion of National Education Day, i.e. 11th November, 2012. As compared with Aakash-1 launched in October 2011, this advanced version has a processor which is about 3 times faster, memory which is twice as large, and capacitive touch screen as compared to resistive touch screen.

Talk to a Teacher: Under Talk to a Teacher project sanctioned to IIT, Bombay A-VIEW developed by Amrita Vishwa Vidyapeetham is being used as the collaboration tool for the National Teacher Empowerment Program. Prof. Deepak Phatak, IIT Bombay, leads the National Teacher Empowerment Program using A-VIEW to train thousands of college teachers across the nation.

Virtual Lab does not require any additional infrastructural setup for conducting experiments at user premises. One computer terminal with broadband Internet connectivity is all that is needed to perform the experiments remotely. Over hundred Virtual Labs are currently ready for use and available at one common website www.vlab.co.in. These labs were dedicated to the nation on 23 February 2012. Over 50,000 students, (in approximately 150 colleges) have used the Virtual Labs and have provided user feedback.

Educational Resource Planning (ERP): NMEICT has initiated a project called ERP mission with IIT Kanpur as lead institute. Other partners in this project are AMU Aligarh, AVV Kochi, DEI Agra, IGNOU Delhi, IIT Roorkee, JMI Delhi, NIT Hamirpur, and SMVDU Jammu. The objectives of the project is to build, deploy and manage web based software system for use of Indian academic institutes. IIT Kanpur had developed an LMS called Brihaspati which is a learning management system. It was decided that the whole ERP system can be built around it. With the help of other institutes, the other modules have been identified and each partner institute is developing one or more of these subsystems. Currently following modules like multi-institutional architecture (Brihaspati-3), MHRD Multisite Grant Management System (MGMS), Data Visualization System, Project Management System, Online admission system, system for payroll generation, E-portfolio, Web Housing Management System are available and are being further enhanced.

e-Yantra: e-Yantra is an initiative to incorporate Robotics into engineering education with the objective of engaging students through exciting hands-on application of math, computer science, and engineering principles, in order to turn them into engineers who can support a rapidly growing economy. The goal of e-Yantra is to enable effective embedded systems and Robotics education across engineering colleges in India, by (i) providing training for teachers and students through workshops where participants are taught basics of embedded systems and programming, (ii) engaging teachers and students in hands-on experiments with robots – through competitions where participants are given robots to implement a solution, and (iii) helping colleges to set-up Robotics labs/clubs by awarding a basic set of robots and expert advice to colleges, facilitating setting up of labs, in addition to training their teachers through workshops.

DTH Program: MHRD is poised to launch the most ambitious programme, under NME-ICT, to generate and deliver structured education content to reach homes, the most cost effective way, so to achieve our composite goals of ensuring 'Access, Equity and Excellence' and bridging the digital divide in higher Education, soon by launching, '50 DTH educational channels' on 24x7 basis. The MHRD DTH programme has the potential to be watched by 67% Homes in India. Teacher's/SME's shall mostly deliver 8 live Sessions a day/channel, each of one hour. The students can seek answers to their queries instantaneously from the teacher during the transmission and it shall benefit all watching the telecast. The live telecast shall also be viewed on PC's, Laptops, Tablets, Smart Mobiles through Multicasting. The content delivered shall be converted into e-Contents and viewers can benefit watching the content on demand at their convenient time, place and pace.

VI. KEY CHALLENGES OF ICT USAGE IN HIGHER EDUCATION

The challenges to ICT usage among academic staff ranges from, lack of funds, no opportunity for training, lack of sponsorship by the school management, inability to acquire personal ICT facilities, no ICT facilities at workplace, poor electricity supply, lack of ICT knowledge, insufficient time due to workload, lack of interest in learning, and lack of time for practice. (Oye et al, 2012). While there is an upward trend in acceptance of ICT in higher educational institutes, India still has to traverse a long path. Typical challenges of ICT usage in higher education are as follows:

Absence of effective e-content in regional languages: Most of the content available is in English or Hindi. India is a country with more than 20 major languages. Regional language computing continues to be handicapped due to the absence of script-level and font-level standardization. As a result, the availability of e-content in regional languages is limited.

Low penetration: ICT in higher education institutes is largely limited to Tier I cities or major central or state government institutes. There is very little usage of ICT infrastructure in rural areas and Tier II and III cities.

Lack of ICT infrastructure in majority of higher education institutes in the country: Major central and state government institutes and some leading private institutes have set up excellent ICT infrastructure in the country. With wireless access in campuses, 1:1 student-computer ratio and access to online databases, these institutes are the leaders in ICT usage in the country. However surveys have shown that such institutes are in a minority. A large majority of the institutes are severely lacking in ICT infrastructure. Coupled with low level of Internet penetration in the country, majority of the institutes are yet to benefit from ICT usage.

Funding: Budget constraints have led to limited implementation of ERP or student lifecycle management systems in higher education institutes. Many institutes have not been able to measure benefits from implementation of IT applications for administrative functions.

As shown above, it is quite clear, that the development and increasing use of ICT in education is facing many challenges. However, one can transform these hurdles into opportunities by giving top priority to the development of ICT and telecommunication infrastructure (computers with internet access and broadband connectivity) in order to provide universal and affordable access to information to people and institutions in all areas of the country. The government can achieve this aim as follows:

Development and research in mobile education: With such a huge penetration of mobile network in India, this will be an effective media for disseminating education to the distant corners.

Government funding to increase connectivity: Apart from the National Knowledge Network (NKN) connecting all universities and institutions, other modes like broadband should be promoted so that all panchayats are connected and every student can avail virtual classrooms.

Quality in education: Reputed Private firms can partner with National Assessment and Accreditation Council (NAAC) to create quality benchmarks and provide accreditation

Central repositories: Portals should be created where education institutes can upload authenticated examination results, students' information, and details of subject and courses. These portals can be accessed by any parent to get first-hand information on future education for their children.

e-Text books: Publication of high quality e-text books and e-journals should be given to three or four agencies on a public-private partnership model.

VII. CONCLUSION

In the current environment-conscious world, the importance of education and acceptability of ICT as a social necessity has been increasing. Social acceptability of information and communication tools is necessary to improve the mobility in the society and increase the pitch for equity and social justice. Education as a qualitative development is not confined within the classroom structure. The modern tools of ICT such as eLearning and online practice of learning and getting information are much sought after by the students as well as by the institutions.

ICT-enabled education can do wonders that no one can imagine and help pave way for the creation of virtual universities in the long run. ICT can also significantly contribute in efficiently managing the governance in the universities and colleges. ICT, if used creatively, can make a big difference in the way teachers teach and students learn and can help students acquire 21st century skills like digital literacy, innovative thinking, creativity, sound reasoning and effective communication. ICT-enabled education can also be a solution to the growing demands for enrolments in higher education in India and thus help increase the gross enrolment ratio (GER) which at present is very low (about 12%) as compared to the world average of 23%. Major factors contributing to this digital divide include quality and cost of physical infrastructure, lack of knowledge about full capabilities of ICT and lack of availability of high quality content uniformly across the country. One can transform this digital divide into a digital opportunity by giving top priority to the development of ICT and telecommunication infrastructure (computers with internet access and broadband connectivity) in order to provide universal and affordable access to information to people and institutions in all geographical areas of the country.

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