

Analysis of Recent Trends in Higher Education in India Using Information Communication Technology (ICT)

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Abstract

In the era of digitization, technology and knowledge have taken center stage in all national and international discussions. Education is a fundamental tool for socio-economic development and progress of the country. Higher education is an important area of focus, which needs to be modernized in order to make it more efficient and impactful. Information Communication Technology (ICT) can make this happen. Teaching and learning process have evolved from being one-sided activity to an active process involving exchange of ideas, introduction of creative tools and techniques has made the whole exercise a collaborative initiative. ICT is crafting the role of future education in India by emerging as one of the most efficient means used by both learner and teachers. The use of ICT in higher education works towards content generation, building research in critical areas imparting education and integrating knowledge with the advancement of technology. This article is divided into three sections. The first section explains the role of ICT in higher education system of India. It gives the macro-level analysis of recent initiatives taken by government in higher education sector using Information Technology, particularly those which have arisen due to Covid-19 pandemic. The second section reviews the importance of ICT in three key areas - teaching and learning, research, and education planning and administration. The final section highlights the role of ICT in addressing current challenges like those created by COVID-19 pandemic and suggests some policy solutions in implementing ICT in higher education.

Key Words: ICT, Higher education, Digital technology, e-Learning, Innovation.

Introduction

Information Communication Technology (ICT) has become an integral part of most of the sectors including education, where it acts like a catalyst of change. Use of ICT in education is rapidly improving the landscape of education in terms of the teaching and learning process. Traditionally, these two processes have been one-sided activities. However, with the advent of ICT, these are changing to active processes which involve exchange of ideas, introduction of creative tools

and techniques, thereby making the whole exercise a collaborative initiative. In the present times, the role of ICT can be defined as a tool to maintain balance between the areas of knowledge, content creation, expansion of multi-disciplinary research, dissemination of information linking the stakeholders associated with education sector. This paper analyzes all these contours of discussion and brings insights into the higher education scenario in India and its patterns of growth.

India's education system is a major contributor in building its economy. The rise of all sectors based on advanced technologies and globalization has brought a paradigm shift in the knowledge requirements. Continuous competition has enhanced pressure on all individuals to acquire specialized skills. Technology has facilitated increasing the reach of education to various sections of society. As a result, the higher education system has witnessed tremendous growth in many aspects like improving equality, enhancing operational efficiency, enrolment numbers, teacher student ratio, institutional capacity, etc. The inception of ICT has transformed and expanded the conventional boundaries of education. New technologies and education software are not only changing the approach of students, they are also revolutionizing the role of educators, creating philosophical shifts in approaches to teaching and role modelling in classrooms (Bernard, 2017). Technology based learning system allows flexibility in terms of time and space. Technology solutions such as virtual classrooms can be accessed from anywhere across the world. ICT contributes in dissemination of information irrespective of the geographical boundaries (Oliver, 2002). The use of ICT in higher education has facilitated lifelong learning opportunities that allows people to continue their studies besides busy working hour schedules through distance and open learning. (Das, 2017) Traditional learning environment, bound to rigid time frame and location, has been replaced by web-based education. ICT generates a number of opportunities to enhance improvement of academic processes

and coordination in higher education. It is mainly intended to improve education access so as to provide education for all.

Trends in the growth of Higher Education in India

India's higher education system is the world's third largest in terms of students, next to China and United States (Manoj, 2019). Higher education in India gained momentum with the establishment of ancient universities in Nalanda, Takshashila, Vallabhi, Kanchipuram and some other cities. However, the foundation of western education was laid by Britishers. One of the main purposes of western education was to establish English as a medium of instruction. Higher education in modern India covers education beyond 10+2 levels. It comprises of colleges and universities, which produce undergraduate, post-graduate, diploma, certificate, doctoral and post-doctoral courses in India. University Grants Commission (UGC) is a pioneer institute established by Central Government for promoting and coordinating university education and is also responsible for regulating and maintaining the standards of teaching, examination and research conducted by the universities.

The National Policy of Education NPE, 1986 has laid emphasis on the importance of higher education, due to its potential to contributing to national development through dissemination of specialized knowledge. Acknowledging the demand for technology in education, the Government started using it since the period of 1970's. After the major reforms in the year 1991, the relevance of technology in education was realized

in various policies and projects. The reforms of 1991 attracted large number of people towards entrepreneurship, which in-turn opened doors for privatization. Education was not only regarded as a symbol of status but also as a way to move ahead of others. This accelerated the establishment of large number of institutions and centers of excellence. The Right to Education Act RTE, 2009, which is often seen as a watershed moment in the education sector, stipulates compulsory and free education to all children in the age group of 6-14 years. This Act heavily relies on ICT to make education accessible to all.

Privatization and globalization of higher education seeks to establish global prospective on education and sensitize youth for understanding the technological changes in the multicultural world. Higher education in India has also undergone a significant change as a result of technological innovations (Mishra, S & R.C. Sharma, 2005). The present trend prophesizes that the foundation of higher education system will primarily continue to be in the conventional classroom halls. It will get enhanced with new technology-based tools and integration of modern techniques of education, specialized trainings and advanced analysis thereby extending the scope of learning opportunities.

ICT enabled education has provided a competitive edge by offering enhanced services to the students, flexibility driving greater efficiency and creating enriched leaning experiences. It is about a new way, in which people can communicate, inquire, learn, make decisions, and solve problems. The use

of audio-visual aids like television, radio and internet for the dissimilation of information is not new. The integration of first satellite in education as Satellite Instruction Television Equipment (SITE) was launched in 1975-76. This led to the formation of Central Institute of Educational Technology (CIET) and State Institute of Educational Technology (SIET) studios for production and transmission of school-oriented programs. CEC was the nodal agency for creating educational media and resource centers and audio-visual centers in number of universities. Later with the launch of internet in 1995, computer and multimedia were introduced in teaching and learning process.

India has taken up major step towards content delivery and fostering education based on ICT through the launch of a satellite named EDUCAST on 20 September 2004, to bring a revolution in education. At present, a National Mission on Education through Information Communication Technology (NMEICT) was introduced in 2009 by the Ministry of Human Resource Development (MHRD) with an aim to provide an opportunity to every teacher and expert to expand knowledge collaboration for helping every individual learner, thereby reducing the technological divide.

The National Mission on Education focuses to create a balance between knowledge creation, content dissemination, research analysis in important area of imparting education and enhanced integration of best use practices globally with local practices. ICT helps in manifesting the capacity building of educational institutes.

National Knowledge Network (NKN) and NMEICT provide digital connectivity across all national and other colleges for the purpose of resource sharing and to establish country wide virtual classrooms. It has also helped to bridge the gap by providing e-content to students who fall short of resources. Similarly, UGC-Consortium for Educational Communication (CEC) and Indira Gandhi National Open University (IGNOU) were entrusted with responsibility to develop e-resources for both regular and distance learning courses. Digitalization has not only provided easy access but also low costs, affordable and high-quality resources to students and teachers.

Number of new initiatives like Global Initiative of Academic Networks (GIAN), Study Webs of Active learning for Young Aspiring Minds (SWAYAM), spoken tutorials, National Digital Library, National Programme on Technology Enhanced Learning (NPTEL), National Academic Depository (NAD) and Digi-Locker App for storage of academic documents are some of the series of programs and initiatives started by the Government in recent times. Their focus is to extend academic and research support by creating high quality e-content, teaching and learning material to develop collective learning experience

Role of ICT in the times of COVID-19 Pandemic

Perhaps the biggest proof of the utility and scope of ICT in education had emerged from the challenges created due to the COVID-19 pandemic. The crisis which has gripped the country

and the world since the start of 2020 has been unprecedented in many ways. When it comes to the education sector, most States in India started closing down schools since March, 2020. As per an estimate by UNESCO, the current pandemic has affected about 70 percent of the children worldwide out of which, around 300 million children are in India (UNESCO, 2020). The disruption has affected more than 90 percent of the students in India (MHRD, 2020a). To mitigate the losses of students, ICT has been the key instruments in the hands of the Government and private institutions. The educational institutions are heavily relying on online delivery of class lectures, webinars, online group discussions and online assessment of student's learning. In India, the previous decade has shown a significant penetration of mobile and broadband connectivity. Although, the country was not fully prepared for such a huge shift from offline to online mode of education, concerted steps are being taken to make the process easier for both students and teachers. Some States like Chhattisgarh have launched a dedicated portal called 'Padhai Tuhaar Dwaar' (Education at Your Doorstep) which allows the teachers to deliver online lectures using mobile technology. As per the official data more than 1,80,000 teachers and more than 20 lakh students have registered on the portal. In some Union Territories like Jammu and Kashmir where high-speed connectivity is a problem, the schools are using recorded videos through social media apps like WhatsApp and Google Drive to deliver the lectures. Similarly, other higher educational universities have moved

all the academic requirements like Ph. D. defense presentation and academic conferences, etc. to online mode (see for example Jamia Millia Islamia University, 2020).

The Ministry of Human Resource Development in India has recently launched a web-portal named YUKTI 2.0 (Young India Combating COVID with Knowledge, Technology and Innovation) to give better inputs for policy planning in COVID-19 pandemic and monitor the activities effectively (MHRD, 2020c). Further, the government is extensively using SWAYAM Prabha, a group of 34 DTH TV channels, and Radio including Community Radio to provide education to the students in the remotest parts of the country. In addition to this, many new ICT-based initiatives have been taken by the Government to address the challenges due to the pandemic. A comprehensive initiative called "PM e-Vidya" is going to be launched which will integrate all the digital modes of education like DIKSHA (one nation-one digital platform), SWAYAM, TV and radio (MHRD, 2020b). As per the assessment of The World Bank, Indian education sector has brought out many tools based on ICT technology. Digital apps like e-Pathshala (which provides NCERT material online) and The National Repository of Open Educational Resources (NROER) portal are few such examples (The World Bank, 2020). In education sector, 100 top ranked universities have been selected to provide full-fledged online programmes. This will be augmented with the already operational SWAYAM MOOCs courses covering the curriculum of many universities. The results in the past few months have been positive as

the official data suggests that "about 50,000 people have accessed SWAYAM since 23 March, 2020" (MHRD, 2020d). Nevertheless, these efforts cannot be assumed to have solved the problems in online education completely and there are many challenges which still exist. These will be discussed subsequently in this paper.

ICT in Teaching and Learning

Ensuring universal access to ICT has been one of the prime objectives of government. The major teaching and learning challenge faced in higher education resolves around the student's diversity which includes academic excellence, language and schooling background. ICT enabled education has the potential to promote the development of student's decision making, problem solving, data processing skills and communication capabilities. Technology application is not limited to classroom but these sessions are being replaced with virtual sessions also. Critical thinking, deep-dive into a subject, cross-analysis and multi-angle approach has become very important as the sources of information are varied and the issues at hand complex.

Bringing ICT in the field of higher education has fulfilled the educational requirements of nation through part-time and distance learning schemes. Implementing online pedagogy across various universities and colleges has increased over the period of time. The installation of Wi-Fi enabled system has resulted in education system getting upgraded with easy accessibility, accountability and availability of subject

matter for the students.

Introduction of ICT in the field of academics depends upon teacher's ability to keep in pace with the developments since teachers are responsible for the aggregate development of learning process. ICT-based education makes use of new innovations like power point presentation, video clips, LCD projectors, animation modelling and stimulations, based on collaborative learning practices. ICT generates student-centered learning processes, where teacher acts a facilitator or mentor to promote learning among students based on interactive teaching strategies. Seminars, conferences and group discussion further builds up the learning capabilities of students through use of electronic devices and tele communication equipment's like projector, CD-ROM, LCD and other display services connected to internet.

Virtual learning practices include assimilation of different set of network system and information infrastructure for promoting education. Broadband, EDUCAST, Education and Research Network (ERNET), digital libraries and electronic resource programs serve different institution in different disciplines designed to enhance students learning experience. Collaborative learning based on the means of tele-education system supported by chain of networks system like EDUCAST, Wi-Fi and V-SAT promotes better teacher-student interaction.

According to Zhao (2001), there are three conditions necessary for teachers to introduce ICT into their classrooms – firstly teachers should believe in

the effectiveness of technology, secondly teachers should believe that the use of technology will not cause any disturbance, and finally teachers should believe that they have control over technology. Most distance learning programs include a computer-based training (CBT) system and communications tools to produce a virtual classroom (Pingle, 2017). The implication of ICT has fundamentally challenged the basic structure of higher education in India. The government of India has formulated National ICT policy implemented through various institutions like University Grants Commission, All India Council for Technical Education (AICTE), Department of Science and Technology, National Informatics Centre (NIC) throughout the country (Singh & Sharma, 2010). Such initiatives strengthen teaching and learning practices enabling both teachers and students to gain direct access to technology, communication and better learning.

ICT in Research

The growth of higher education sector in India has rapidly moved way forward after diversifying technology in the field of education. ICT in learning process acts as a support system to generate knowledge from various interrelated aspects of education. Communication systems make it possible for the researcher to stay connected to all over the world than being confined to one single institution. The combination of both communication links and digital resources generate online expansion and equalize the access to academic resources. It establishes link across

all subject matter and social media networks. The collection and analysis of data has become much easier through the application of various softwares. The cumbersome task of analyzing data manually is reduced as it facilitates quick and accurate analysis of huge data.

Another important dimension of ICT is to provide use of online text base and online resource centers, which are directly the outcome of tele-communication network and technology. These databases provide provision of online access to e-books, journals, articles and other sources (Young, 2012). The new paradigm in the field of research calls for the development of national policies for ICT in higher education to establish joint information system linking all the higher education institutions. Hannafin & Girasoli (2008) explains the use of asynchronous Computer-mediated communication to promote student self-efficacy and hence improve academic performance. ICT in academic research calls for mindsets that are adaptive towards change (Pingle, 2017).

ICT in Education Planning and Administration

During past two decades ICT has fundamentally changed the basic shape and the working of higher educational institutions. The demand for integration of ICT across various universities and colleges calls for the development of effective educational management practices with comprehensive set of functional administrative measures. With the readily available data for analysis, the administrators can make quick decisions about improvement in education and as well as improvement

in the functioning of institution. By simplifying the administrative tasks and making efficient utilization of resources, it has reduced the cost of paper work and replaced the traditional system of maintaining records. The student administration driven by electronic methods helps in easy revival of information.

E-learning provides online disclosure of assignments, course material, online tests and open educational resources. Other software like Learning Management Systems (LMS) allows the best planning of change management by enabling students to apply for courses directly online, pay fees using digital mediums and also get access to academic material and courses online itself. Thus, ICT can virtually end the physical boundaries by enabling students from across all geographical spectrums to interact and facilitate the rise of global education.

Institutional information systems provide tools for management of human resources including students, teachers and staff and make it easily available to parents and administrators. This provides a much-needed facility to administrators for planning and allocation of resources, work distribution, supervision and performance analysis. This also includes relevant communication to and from the institutions and among peers. Staff administration use Information and Communication Technology (ICT) for processing of voluminous records in a quick, meticulous and impeccable manner thereby making data retrieval easier. The difficult task to track the teachers as well as student's movements

and progress at college/university, state and central level and to keep the record of the assets has ultimately an impact on financial planning and budgeting (Meenakumari & Krishnavani, 2010). Joshi (2012) highlighted the usage of ICT for administration in higher education institution in terms of general administration, payroll and financial accounting, administration of the student's data, personal record maintenance and library systems.

Challenging factors affecting utilization of ICT in Higher Education

The emerging role of ICT in higher education provides prospects and trends of integrating technology into education activities. Technology-based education has shown a significant progress with regard to better quality, greater access and equality across the country. The availability of ICT has helped create a digital India and strengthen its technological capabilities in the recent decades. Ensuring equal access to technology means that the digital divide between the urban and rural students must be reduced and the students coming from educationally backward areas must be given tools to access information. The need is to articulate training and computing skills to bring awareness and reduce rural-urban divide which is one of the major challenges faced in implementing ICT in domain of higher education.

The inaccessibility of ICT resources may be due to the lack of personal access for the teachers, poor quality hardware, poor resource organization and software not being appropriate

(Becta, 2004). ICT based education provides government an opportunity to reach more isolated groups. Berner (2003) found that the faculty's belief in their computer competence was the greatest predictor of their use of computers in the classroom. Therefore, lack of awareness about the ICT facilities and absence of skills to use the new technologies in teaching and learning is a major impediment (Sultana & Haque, 2018).

Another factor which is a challenge to ICT is financial crises and absence of political will. India has one of the largest higher education systems in the world with majority of students studying in various colleges and universities. Not enough has been done by the education technology providers to integrate pedagogy behind the use of technology. Most of the state universities and colleges are running short of infrastructure and funds. ICT supported systems like hardware, multimedia, audio visual aids of teaching demand for huge funds. The demand to meet the technological needs cannot be provided by stakeholders. The use of ICT in education depends upon the political will. Management of the India's education system faces challenges of centralization, rigid bureaucratic structures, lack of accountability, transparency and professionalism. As a result, the burden of carrying the administrative functions have increased and the focus on academics and research has diluted (Kumar & Ambrish, 2015). Many universities and higher educational institutes do not have adequate funds to purchase books and other printed material for their students.

Development of digital content enhance adaptive learning at personalized space allows learner to work in its own pace.

Linguistic Barrier is also a major challenge to ICT's success. India's linguistic diversity necessitates for the development of content in multiple language (Pegu, 2014). As English is dominant medium of instruction as well as the one most in use a large proportion of education software produced worldwide are in English. It limits the scope of information access to people who lack the ability to understand English language. Standardization of local language is necessary to lift the barrier between technology and common man.

Professional development of the teacher is the key factor to the successful integration of digital technology in teaching. Quality professional training programs help the teachers to a great extent in implementation of technology in education and in transformation of teaching practices (Brinkerhoff.J, 2006). The teachers should meet the demands of learners and provide them with the relevant curricula. Unavailability of technical support within the institutions results in ineffective use of resources. Another factor of consideration is the teacher's readiness to accept the change to promote critical thinking skills and collaborative learning practice in the students. Lack of confidence can also be due to the teachers' lagging in latest knowledge about technology and this leads to resistance in using ICT in education.

Extending support towards technical education is a very important necessity. Majority of educational portals show

that much work has been done in the discipline of science and technology and not in humanities, social science or commerce. According to OECD (2014), the percentage of students enrolled under humanities and social science is comparatively lower than that of science and technology as a result lack of availability of e-content in such disciplines.

In terms of technical support many institutions like IITs, IIMs and NITs are well equipped with the advanced technological devices including high speed networking devices whereas non-science institutions are not at par. This gives a false perception that social science and humanities do not require technology. The technical problems faced while implementing ICT can "impede the smooth delivery of the lesson or the natural flow of the classroom activity" (Sicilia, 2005). As a result, these disciplines remain deprived from technology due lack of technical support like latest software and techniques used in research as well as academics.

Lack of ICT Support Infrastructure and Resources is another issue which needs to be tackled. The higher education system in India is facing chronic shortage due insufficient IT system and infrastructure. The logistical needs and technical support to such institutions can be addressed through proper Action plan. Further recurrent cost of software license like application for main information systems, specialized application, database platform and desktop application should be considered. This helps in strengthening system and norms of

higher educational institutions, thus increasing transparency. Another important barrier in integrating ICT in higher education requires balance between the educational goals and economic realities.

Wims (2008) found that lack of Developmentally-Appropriate Software (DAS) is one of the difficulties faced by teachers and students. The reason for human resource constraint at present is due to the lack of manpower for teaching and low motivation levels among the educators to integrate ICT in teaching and learning (Khan, Hasan, & Clement, 2012). Education system based on ICT requires the establishment of infrastructure facilities, acquisition of technologies and their periodic upgradation, management and professional support system. The other significant challenges rise from various external factors like environment, cultural and education aspects faced by policy makers, educational administrators and students which can be overruled by induction of innovative models collaborating with existing ones. ICT contributes in disseminating information irrespective of geographical boundaries. It disjoints information from physical location boundaries and thus, integrates rural and remote communities in the global network of knowledge and culture.

Conclusions

Digital revolution is a shift from mechanical and physical mediums to digital medium that focuses on various aspects of socio-economic parameters of society. In the present context of education, it is not possible to improve

or disseminate knowledge without the help of technology. Internet has become the integral part of day today activates, integrating technology, content and various stakeholders involved. ICT in higher education is relevant in facilitating effective and quick decision making, aiding and analyzing data, facilitating information and improving skill acquisition.

Distance and open learning using virtual classrooms, internet and satellite medium provides quick mode of course delivery. A multidisciplinary approach in higher education is required so that students' knowledge may not be restricted only to their own subjects. Administrative support systems like Enterprise Resource Planning (ERP) system, implemented in universities help in maintaining the complete record of students. The government needs to increase investment in education through ICT, formulate policies that are adequately funded both at Center and at State to ensure democratization of education. The gap between demand and supply of education needs be fulfilled with technological innovations. In order to bridge this gap, it is necessary to facilitate the involvement and cooperation of public and private players in higher education. In addition to this, there should be proper control and licensing, quality assurance, accreditation of technology to reduce complexities in implementation.

Community participation and self-sustainability also adds a step forward towards adoption of technology. Government should take initiative to ensure a joint effort with software companies and teachers for preparing

quality content to support academic institutions for better communication circular and language diversity. There and integration of ICT in education for a is a need for government authorities successful process. to extend support to higher education

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