Indian Higher Education at the Cross-road: Uses of ICT in Higher Education

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"Aum Asata ma Sad gamaya
Tamaso ma jyotirgamayo
Mrityarma amritam gamaya
Aum Santi Santi Santih"

- BrhadaranyakaUpanisads 1.3.28

Abstract:

According to the rule of nature, darkness can be removed by light; ignorance can be removed by truth. Similarly, in the 20th Century, sudden and tremendous change in the thinking made a great impact on the educational system. Improvements in the technologies, took the human civilization to the next door step to the modern era of education. Where quality, access and cost of education got extreme acceleration. This world becomes a "Global Village". Education is a social process. On the one hand, it changes society and on the other hand education changes itself with the change of society. In respect of the other countries like USA, UK, Australia, Republic of China; India is also improving their educational methods, instructional systems and curricula and evaluation procedures through educational technologies. Information and Communication Technologies or ICT is taking main role in the changing process of the educational system. Development in the tools of ICT – Satellite Radio, Computer Assisted Teaching(CAT),Computer Assisted Learning (CAL), Virtual Education, Email, Teleconferencing, Computer Conferencing etc make this dream come true. Now-a-days development of low cost TVs and computers have widened the imagination of the world of human being. As a result, Higher Education is getting much more benefits from the multidimensional development in the field of Educational Technology. So any student from anywhere from the country can be the part of the education at any stage of life. The agenda of Education for All (EFA) in India can spread its wings wider than before. The improvement in the Higher Education in India confirms its august presence in the arena of the world education. This paper will highlight the versatility of ICT in Higher Education.

Keywords: *ICT, Online learning, Higher Education, Quality, Access, Cost, Tools, Educational Technology.*

1. Introduction:

There was a young lady young girl named Bright,
Whose speed was far faster than light
She set out one day,
In a relative way,
And returned on the previous night.

-R. Buller[1]

[1] *The limerick "Relativity" by A.H. Reginald Buller*

In the first part of the 20th Century there was a sudden and tremendous change in the thinking pattern of man. This is partly due to the discovery of Quantum Theory and Special Theory of Relativity and partly due to the increased application of science and technology in everyday life. Improvement of wireless systems and spacecraft technologies has improved radio and telecommunication hardware and software systems also. Development of low cost T.Vs and computers have widened the world of imagination of the human beings. Now-a-days most modern information technologies have shortened the distance in the world. This world has now become a global village.

Education is a social process by which societies are changed and education changes itself with the change of society. Educational Technology is the key factor of this changing world of education. These would change the educational methods, instructional systems and curriculum and evaluation procedures. Exactly, this is what has happened today. ICT (or Information and Communication Technologies) makes this dream come true. Three parameters are important for implementation of ICT in Higher Education –Quality, Access and Cost. Teaching learning process is getting the acceleration in the progress of educational system, especially in Higher Education of the country. In spite of some difficulties in implementation, tools of ICT are making this process possible. India is representing brightly in the field of education.

2. Objectives:

After going through the paper, we will be able to know

- How Educational Technology (ET) developed the Higher Education system
- ICT and uses of its different tools
- Why ICT in HE?
- Comparative studies about Higher Education (in respect of the use of ICT in Distance Education) among different countries
- Some futuristic approach for the development of Educational technologies.

3. Relevance of the Study:

Most researches have been done on the basis of quantitative data, by which trends of education system can be assessed in respect of the use of ICT. Impact of ICT in the Higher Education can be measured by collecting the data from different colleges & universities. This paper will emphasize on the comparative study of the use of ICT in different countries. The promises of ICT for transforming tertiary education and thereby advancing the knowledge economy have rested on three arguments: ICT could expand widen access to Higher Education and training; improve the quality of education and reduce its cost. The paper evaluates these three promises with the sparse existing data and evidence.

4. Methodology:

Most of the information is collected from the secondary data like Books, Study Materials, Newspaper, Journals, and Websites etc.

5. Meaning, Nature and Scope of ET:

According to the National Council for Educational Technology (NCET) UK (1971)[2] - "Educational Technology is the development, application and evaluation of systems, techniques and aids to improve the process of human learning".
A more elaborate definition of E.T. in Budapest (1976)[3]and it was also accepted by UNESCO & UNDP. The definition is as follows - "ET may be defined as a separate field in the theory of education dealing with development and application of the use of the educational resources. In detail it implies the following principles-

i) Clear educational objectives;
ii) The logical order of the elements of content;
iii) The structure of the teaching learning process;
iv) The development of models leading to the acquisition of knowledge;
v) The introduction of feed-back with teaching learning process;
vi) Media selection and criteria of media selection, also media evaluation and optimization;
vii) The development of equipment to meet educational, economic, aesthetic and technical demands;
viii) The study of the effectiveness of hardware and software in practical situations;
ix) The various approaches to effectiveness in educational systems."

- The nature of ET can be summarized as follows:

i) ET is the application of scientific principles to education.
ii) ET stresses on the development of methods and techniques for effective teaching & learning.
iii) It stresses on the organization of learning situations for the effective realization of goals.
iv) It gives importance of designing and measuring instrument for testing educational outcomes.
v) It can control the outcomes of the education by controlling, media, methods and environment.
vi) It involves input, process and output aspects of education. Thus ET also involves in system approach in education.
vii) It also helps communication in education.

According to Henry Elton (1993)[4]the scope of ET has been expanding after the World War II. Elton said that the scope of ET has expanded from mass communication to individualized learning and then group learning by the use of Research, Development and Use.

6. What is ICT?

ICT is an acronym that stands for Information and Communications Technology. It is the integration of information processing, computing and communication technologies. ICT can be defined as "diverse set of technological tools and resources used to communicate and to create,

2 Definition of Educational Technology from Application of Educational Technology
[3]Definition of Educational Technology from Application of Educational Technology
[4]Scope of ET by Henry Elton(1993)

disseminate store and manage information". ICT is changing the way we learn, work and live in society and are often spoken of in a particular context such as in education, health care or libraries.

7. Why ICT in Higher Education?

Generally, ICT is making the way to access the quality education in a very low cost for every level of education. Higher Education comprises with all post-secondary education, training and research guidance at educational institutions such as Colleges, Universities; where most of the students are in the sixth stage of the Erikson's psychosocial development. If the system will help them to feel easy with it, then they can make a relationship with their stream. As a result, research work or study makes them non isolate with the educational system and overall Higher Education gets benefitted. Here ICT is becoming the catalyst for making this relationship. Some benefits are as follows-

i) Opens the door to lifelong learning
ii) Enables simulation, role-playing and decision-making exercises
iii) Facilitates virtual Communities and Communities of Practice
iv) Gives access to huge amount of information
v) Transformation of Educational Process
   - From teacher-centered model of education to student-centered learning
   - From presentation based passive process to active learning based on exploration
   - From behavioral to constructivist and social models of learning
   - From traditional forms of verbal communication to the communication that involves symbols, multiple representations, hypertext etc.
vi) ICT enables students with hearing problems to
   - Translate speech into text (or sign language) and vice versa
   - Use communication aids along with specialized software for classroom activities
   - Get easy access to information and communication (e-mail, web, blogs, wikis etc)
   - PC and Overhead Projector
   - Educational software with educational uses (after proper testing)
   - Interactive white boards/smart boards

8. Tools of ICT and Uses:

ICT has become popular in formal education for its advancement of technology. ICT has played a major role in the innovative applications of radio and television, computer technology, telecommunication networks, Internet and Intranets in teaching–learning situations. It is also relevant for accelerating opportunities for access to education and for individual/group in formal education. It has removed the barriers between formal and distance education. The launch of educational satellite –EduSat[5]especially devoted satellite for education, during September 2004 has given a remarkable scope for ICT-based education for both formal and distance learners.

[5] *Uses of ICT from IGNOU study material*

❖ **Computer Assisted Learning (CAL)**[6] has become very popular in colleges, training institutions, universities etc. It is used as an input for individualized learning schemes and also accelerates teaching-learning processes with higher level of effectiveness and efficiency. Here computer delivers the instruction directly to students and allow them to interact with it through the lessons already programmed in the system. Moreover, computer provides feedback to the learner on the basis of his or her performance. It plays the role of a tutor as well as of an expert. CAL is used in the form of tutorials, games, simulations etc.

In the *tutorial mode,* the student interacts directly with the computer, which is programmed to understand and react to the student's responses. The programmed text presets a number of problems, particularly in determining whether the student has really mastered the current step and in deciding how to branch the next step. The branching programmed learning materials are adopted as tutorial mode of CAL.

The *games* include educational inputs a learner gets learning concepts by playing games. Rules for games are specified by the author. Gradually learner gets the learning concepts by practicing the games. Instructional games are useful in acquiring new concepts and skills with enthusiasm.

Simulation is used to avoid real life experiments or learning experiences which may be time consuming, expensive, difficult or sometimes beyond the reach of educational institutions. Computers can be used to simulate a real life system by following a set of rules, which really approximate the behavior of the real system. For example laboratory can be created by the simulation for facilitating teaching-learning process.

❖ **Satellite Radio** is going to replace FM radio, which has limited reach. EduSat can also be useful in delivery of radio broadcasts as well as educational TV with a wider scope , which can be accessed by the learner from anywhere in the world (channels like ***Gyan Darshan 1,Gyan Vani***)[7].

❖ **Virtual education** aims at providing computer generated virtual environment which can be used for realistic simulation of natural phenomena, conducting hazardous experiments and participating in virtual classroom teaching. The formal education institutions can provide opportunities for virtual education with a view to supplement or integrate teaching-learning processes of face-to-face mode.

❖ **Teleconferencing** is taking important role in distance education by the use of educational satellite EduSat, by which students can have access to view video lectures and demonstrations. Simultaneously they can interact with the teacher presenting the programme. ***IGNOU and UGC***,

[6]*Application of Educational Technology: Tools of ICT*
[7]*Application of Educational Technology(uses of ICT)*

in collaboration with other agencies have initiated ***EduSat*** based teleconferencing with programmes for distance education and teacher education in country.

❖ **Computer Conferencing** refers to computer based meeting, for exchange of pictures, words, graphics etc. between multiple sites. The users can have access with other users. Moreover, exchange of longer message and a record of current and past comments can also be possible as and when the users would like to do so.

❖ **Internet based learning** is the way of exploring the study materials by surfing multiple web sites. Students or researchers are able to take note from those sites and to download the required pictures, words, graphics, statistics, and so on. The web based information has acted as a boon for availing learning materials from all over the world. Both students and teachers are getting advantage from the modern way of Educational technology.

❖ **E-learning** is one of the familiar ways of learning now-a-days. Where different types of communication like E-mail, Blogs, Wikis are using to acquire or spread the knowledge through the online learning. Any age of a student doesn't matter.

Multimedia based learning, Telephone tutoring, Tele lecture, Tele seminar are also very useful way of exchanging information between teachers & learners in higher education. It directly helps the growth of the country by the enrichment of quality of the education.

9. COMPARATIVE STUDY:

In this part of the paper we are going to compare the uses of ICT in the field of higher education. In the 21st Century the education is becoming easy access to everyone due to the advancement in technology. Especially, educational technology is able to make a change in the view of teaching-learning process. The attitude towards the education is changing positively very fast. Anyone can be the part of the world education. It has removed most of the barriers of education.

- **Australia**[8]is a thinly populated by highly educated nation. Higher education in Australia is provided by a mix of public and private providers. Its role as the modern distance education provider at tertiary level is widely recognized. There are 38 publicly funded universities in the Australia and another seven higher education institutions or colleges which receive public funds and also provide distance education. These universities receive around two-third of their funds from the Commonwealth Government and from Higher Education Contributions Scheme. Distance Education of Australia has entered into its fifth generation which are as follows (by Cues from Taylor [2001]):
  1. The Correspondence model, where learning materials are print-based;

[8] *Comparative Studies of Educational Systems: Comparative Education*

2. The multimedia model, where there is a variety of ways of presenting the learning materials where by print , audio tape, video tape or computer based learning;
3. The tele-learning model, in which modes of presentation of learning material include audio or video-conferencing and broadcast TV or Radio;
4. The flexible learning model, where students have access to interactive multimedia online, computer mediated communication and internet based resources;
5. The intelligent flexible learning model, which builds on the fourth generation but will also allow "campus portal access to institutional processes and resources", allowing the institution to reduce its cost to close to zero.

The levels 4 and 5 constitute e-learning, which has various models –

- ✓ *Mode A – Web supplemented (*participation online is optional for the student)
- ✓ *Mode B – web dependent (participation online is compulsory for the student although some traditional some on-campus component is retained)*
- ✓ *Mode C – fully on-line (there is no on campus direct contact. All resources are delivered through online)*

95% of university students reported making regular use of ICT. Indeed the OECD *2001* report on the new economy states that Australia's leadership in the take up and use of ICT has been an important factor in Australia's recent strong GDP growth (OECD, 2001)[9].

• Japan[10] is known to be a technological developed country. In spite of technological developments use of ICT is not so updated in Japan as far as other developed country is concerned. Mostly all systems are teacher centric in nature rather than student centric.

Japanese undergraduate postsecondary education system is basically comprises with universities and junior colleges. Three quarters of universities in Japan are private schools. As of 2007, 76% of high school graduates go to higher education institutions, including specialized training colleges and 47% of them go to four-year degree granting institutions. This percent is among the highest in the world.

In Japan, distance education programs generally regulated by campus-based programs of higher education. In 2008, 229,734 students were seeking degrees at a distance in 41 universities who provide distance learning undergraduate programs, accounting for 9.1% of total higher education enrollees. In Japan, regular higher education institutions mostly cater to the needs of full-time students enrolling directly from the high school, a majority of adult learners opt to enroll in distance education programs. Most universities (37 out of 41) have both on-campus education and distance education programs. Rests of the universities were distance learning institutions. Education was first recognized by the MEXT (Ministry of Education, Culture, Sports, Science and Technology) in 1950. The majority of distance education institutions are used print-based materials for instruction. A unique distance education institution was established in 1983. That institution utilized radio and television broadcasting as the major mode of

[9] *Larsen, k. and Lancrin V.S. (2005). "The impact on tertiary education :advances and premise"*
[10] *Aoki, k. (2010): " The use of ICT and e-learning in Higher Education in Japan"*

instructional delivery and it was named as the University of the Air (called "HosoDaigaku"[11]) which is renamed as the Open University of Japan in November 2007.

Though there are many other mega distance education institutions in U.K. Open University evolved into a new institution fully utilizing interactive technologies with the Internet. The Open University of Japan is still stuck in the mode of one-way broadcast instructional delivery in most part.

*China[12] is becoming the global leader in every aspect of the global product whether it is commercial product or technological advancement. Modern tertiary Distance Education has witnessed a rapid growth since the 1990s though DE began during 1960s and came to broadcasting mode in 1978. By the middle of 2004, more than 30 million students were registered by the 68 (including China Central Radio and TV University, CCRTVU) modern tertiary online learning providers. Those offer programmes at three levels undergraduate programmes, post graduate programmes for Master's degrees, and vocational diploma, graduate and post graduate levels. The CCRTVU, since 1999has been providing modern distance education through 44 provincial RTVUs, 930 city branches and 2021 country –level sites and 22237 study centers.

At present, China's distance higher education system has basically three components or modes-

a) Single-Mode, which is provided through printed, audio-visual, TV and web-based transmission, run independently by a national system of RTVU with the CCRTVU as its headquarters.
b) Dual-Mode, which is a mixed provision offered by the regular, campus-based institutions of higher education.
c) Consortium-mode, in which DE is provided by various kinds of consortia, e.g., partnerships between universities and IT companies etc. It is now a growing mode of DE.

China's all the modern DE universities have attached great importance to Web-based education ever since they received authority from the Ministry of Education to run online learning programming.

*India has one of the largest higher education systems, with 967 universities (according to UGC as on 2020)[13] in the world. There are 37,204 colleges and 11443 stand alone institutions in India (as per UGC website). The number of students enrolled in the universities and colleges have been increasing since independence. But not so much development has not been done in the method of teaching. The higher education of this country has been suffering from the lack of technological benefits. However, uses of ICT has not only bring the change in the way teaching learning process but also fostered new path for international mobility of traditional and non-traditional students. India has taken a great approach in delivery of education through ICT. Gyan Darshan & Gyan Vani have been playing great role in it since 2000. E-Gyankosh has been using to preserve educational resources by IGNOU since 2005. In 2009, the government has approved

[11] *Aoki, k. (2010): " The use of ICT and e-learning in Higher Education in Japan"*
[12] *Comparative Studies of Educational Systems : Comparative Education*
13 According to UGC as on 31.12.2020

the landmark "National Mission on Education through ICT"[14] scheme, which has aimed to educate 500 million people in the country. So here we have seen that most countries are trying to develop their Distance Education through online learning, which makes easy to learn for the students. In spite of these educational technologies, most of the higher education institutions are yet to be developed.

10. Conclusion:

This paper has sought to explore the role of ICT in Higher Education as we progress into the 21st century. In particular the paper has argued that ICTs have impacted on educational practice in education to date is small but that the impact will grow considerably in future. ICT will become a strong agent for the change among many educational practices. Anticipating current activities and practices, the continuous use and development of ICTs within the education system will have a strong impact:

- What is learned;
- How is learned;
- When and where learning takes place;
- Who is learning and who is teaching;

The emergence of ICTs as educational technologies has coincided with a growing awareness and recognition of alternative theories for learning. The Theories of learning that hold the greatest way today are those based on Constructivist principle (e.g. Duffy & Cunningham, 1996). These principles put forward that learning is achieved by the active construction of knowledge supported by various perspectives within meaningful contexts. In Constructivist theories, social interactions are seen to play a critical role in the processes of learning and cognition (e.g. Vygotsky, 1978). So it will improve the Quality of the Higher Education System.

Online Learning with geographical flexibility, technology-facilitated educational programs also remove many of the temporal constraints that face learner with special needs (e.g. Moore & Kearsley 1996). Students are starting to take interest in the capability to undertake education anywhere, anytime and anyplace. Access to the learners makes possible through it.

Finally, e-learning can be seen as a promising way to reduce the Cost of higher education, which is critical for expanding and widening its access worldwide. It may represent new opportunities for students having difficulties with this traditional format. Although ICT investments are expensive, they can be used at near-zero marginal cost. While, perhaps unsurprisingly, e-learning has not led to the radical revolution in higher education that was sometimes prophesied, some of its forms are already expanded in higher education and have already led to a quiet revolution.

Generally, ICT helps researcher in the following research related tasks-

- Identify research areas & identify appropriate information sources through searching various online portals.

[14] *Utilization of ICT in HE*

- Literature survey & critically analyses known information for further reading.
- Use of information to extend and communicate knowledge across subject area fields with wide community.
- Choose Methods for research (Q&Q).
- Data Collection – manage information/data collectively.
- Referencing;
- Present / share / disseminate Instantaneous information exchange despite geographical distances, cost less accumulation of data and documents.
- Search multiple databases and electronic resources simultaneously.
- Retrieve results in a common format to consume.
- link to others individual databases for more specialized searching;
- Select favorite resources and e-journals, save searches and records, and setup email alerts.

Finally, ICT will be at its best when every student of the country easily will **access** to the same **quality** of education at a low **cost** in every higher education institution in India.

"Arise! Awake! And Stop not till the goal is reached." – Swami Vivekananda

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