Role of ICT based Teaching-Learning in Higher Education in India

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***Abstract*—Globalization and technological advancements have created a new global economy that is driven by knowledge, information and technology. Information and Communication Technology (ICT) has grown prominent in every aspect of life from eating habits to working habits, it has drastically changed everything. How can the educational system be an exception to this trend? Education is a highly social activity. The world is quickly shifting to digital media and information as we enter the twenty-first century, and ICT is essential to this transformation. In the twenty-first century, access, equity, and quality in higher education are all undergoing significant change in the country. The development of ICT-enabled workers who can make professional contributions in an ICT-enabled workplace is facilitated by ICT-enabled higher education systems. More access to information, improved communication, better cooperation and collaboration, and pedagogical advancement are all benefits of ICT in teaching and learning. By converting teaching and learning into an active process that is tied to real life, ICT may contribute to improving the quality of education. The learning experience in an ICT-based teaching-learning system is lifelong and is not limited by strict time or place restrictions. "Anytime education anywhere" and "learning on the web rather than learning about the web" are the phrases of the ICT-based educational system. In order to enable the teaching-learning community to participate in the global market with sustained growth and development, the Indian higher education system aims to impart the total development of individuals and society. This paper sheds ample light on the role of ICT in the Higher Education in India in the 21st century.**

***Keywords*—Information and Communication Technology (ICT), Teaching and Learning, Higher Education, 21st century**

I. INTRODUCTION

One of the most important systems for modern society and personal development is education. In developed and developing nations, education is a key tool for transformation. For every resident, it improves their living conditions and quality of life. People are prepared for both the present and the future through education, which also helps them get ready for employment. ICT plays a key role in the fast transition to digital media and information in the twenty-first century.In today's globalized culture, there is a constant need for qualified and competent labor. In light of this, universal access to high-quality higher education has become an essential component of economic development and progress. Therefore, ICT is essential for handling information and turning it into knowledge, which is a fundamental need for citizens to be responsible members of this modern technological and globalized world. In the twenty-first century, the nation's higher education system is undergoing significant change in terms of fairness, accessibility, and quality. One of the many ways to deliver education effectively and efficiently is through ICT. Several roles that ICTs can and do play in education have been proposed. These include enhancing educational results, expanding and raising the standard of education and learning (Wagner, 2001; Garrison & Anderson, 2003), producing the graduates and citizens required in an information-based society, and serving as a driving force behind an assessment of teaching methods(Flecknoe, 2002; McCormick & Scrimshaw, 2001).With ICT, classroom-based teaching and learning approaches give way to learner-centric ones, while wireless and e-learning technologies provide unlimited access. ICT use may change the teaching and learning process and provide effective learning environments, providing students to approach information in a proactive, self-directed, and effective manner (Volman & Van Eck, 2001; de Corte et al., 2003). Innovative ICT usage is thought to greatly improve the higher education system and solve the three main issues of staff and student information quality, equity and access.

ICT ENABLED EDUCATION

In order to gather, store, process, transmit, and display information (speech, data, text, and picture) as well as associated services, information and communication technologies include hardware, software, networks, and media. Information Technology (IT) and Information and Communication Infrastructure (ICI) are the two components of ICTs. While the latter refers to hardware and software for information gathering, storage, processing, and display, the former refers to actual telecommunications systems and networks (cellular, phone, mail, radio, and television) (Sarkar, 2012).

According to a UNESCO paper that was released online, ICT has been described with a larger viewpoint that emphasizes its scope, importance, and nature of use, particularly in the sphere of education:

A wide range of technical tools and resources are referred to as information and communications technologies (ICTs) and are used for communication as well as for the creation, sharing, storing, and management of information. Information and communication are crucial to the educational process. ICT has contributed to education in both formal and informal contexts, through government-sponsored initiatives, public and private educational establishments, profit-and non-profit organizations, and secular and religious societies. (UNESCO.org)

In view of ICT, education can be classified in three main categories:

- E-learning
- Blended Learning, and
- Distance Learning

"E-learning" or "electronic learning" refers to learning that is aided by computers. It is frequently linked to the topic of advanced learning technology (ALT), which addresses the technical aspects of learning with networked and/or multimedia technologies as well as related approaches. An alternative name for it is online learning. The foundation for the development of e-learning came from distance learning. On-demand e-learning is a possibility. It solves problems with scheduling, attendance, and travel. E-learning enables online delivery, communication, and feedback. In terms of examinations and content, it permits broad flexibility. Access to the greatest authorities and the finest practices or information may be obtained through e-learning (UNESCO, 2002). More engagement and interaction are made possible by e-learning. It questions the idea that traditional classroom instruction is better (Bhattacharya and Sharma, 2007) . The internet is the primary ICT used to disseminate education through e-learning. Cyber infrastructures, digital libraries, online learning object repositories, and e-portfolios are some of the constituents.

Combining several teaching methods is known as blended learning. It is typically employed to describe a scenario in which a variety of delivery techniques are utilized in tandem to deliver a certain course. These approaches might use a combination of online learning, self-paced learning, and in-person instruction.

Face to face Learning is defined as learning that takes place in a conventional classroom environment, where a teacher instructs a group of students. Lectures, seminars, presentations, tutoring, conferences, and much more might fall under this category.

Self-paced learning gives students the freedom to learn at their own pace and convenience. It can be done in a number of ways, including reading particular chapters from a textbook, studying course material delivered via a web-based or CD-based course, attending classes or sessions that have already been recorded, reading articles recommended by faculty members, working on assignments and projects, and searching and browsing the internet.

Through the use of the internet, students and instructors can engage in online collaborative learning in one of the following ways:

- Synchronous interaction.
- Asynchronous interaction.

Synchronous, which translates to "at the same time," refers to real-time online communication between students and faculty members through the use of chat rooms and/or virtual lessons. On the other hand, Asynchronous means ‘not at the same time’; it enables learners to interact with their colleagues and faculty member at their own convenience, such as interacting through email.

DISTANCE LEARNING

This kind of education involves students working independently from home or in the workplace while interacting with teachers and other students using chat rooms, instant messaging, electronic forums, video conferencing, email, and other computer-based communication tools. Another name for it is open learning. To create a crucial classroom, the majority of distant learning programs use communications technologies and a computer-based training (CBT) system. Many remote learning systems are built on top of the Internet and World Wide Web since they are available from almost any computer platform. ICTs also make it possible to create digital resources, such as digital libraries, which give professionals, educators, and students access to course materials and research materials at any time and from any location. These resources make it possible for researchers and academics to network, share scholarly content, and improve the caliber of instruction.

ICT IN TEACHING- LEARNING

Basic education is necessary for people to be able to obtain and use knowledge in a world that is changing quickly. ICTs must be a part of this ability in the global village. As a result, integrating ICTs would support the development of "knowledge societies" in addition to encouraging personal development. It is imperative that education be made available to everyone, wherever, and at any time. In the current competitive world, lifelong learning has emerged as the key to survival. Therefore, new technologies, skills, and competencies are required to support and/or further this knowledge-driven growth. There is a paradigm shift developing in traditional teaching-learning processes. In modern times, educational programs and practices that support performance and competency are the main focus of instruction.These curricula generally call for a variety of information sources, forms, and types to be accessible; student-centered learning environments that emphasize information access and inquiry; learning environments that are problem-centered and inquiry-based activities; authentic settings and examples; and teachers who serve as coaches and mentors rather than subject-matter experts (Neeru, 2009).

Basic Effects of ICT on Teaching- Learning Process

- Edit effect in terms of quality of students work and practical examples through visualisation;
- Improve languages skills through word processing;
- Promotes the use of peer coaching and peer evaluations;
- Enables learners develop communication skills and a knowledge about different audiences;
- Encourages self-pacing with enhanced capacity to cope with individual learning styles as students may work at the speed and intensity appropriate to their requirements.
- Implications for learning through resources and Web-based access to real-world knowledge;
- Increase students motivation through hands on activity, visual representations and improved modes of presentation;
- Encourages independent learning and individual preferences for process, layout, style and format;
- Give students more control;
- Allow students to produce high quality multimedia products;
- Changes teacher practices, planning tools and assessment rubrics;
- Increases opportunities for classes to evolve and for student experiences to shape outcomes.
- Improve students' quality of work and give them the confidence to perform enhanced learning tasks,
- Allow students to learn independently, which enables more work to be completed
- Enhances achievement due to the reinforcement and practice that ICT has afforded.

INITIATIVES OF USE OF ICT IN HIGHER EDUCATION

Through ICT networks and partnerships, national level institutions can play a leading role in improving technical and management manpower across several disciplines. Satellites for education have invested in the teaching-learning process. In 2004, India launched EDUSAT, the first education satellite in history, to promote distant learning and develop a virtual digital classroom.In order to democratize access to high-quality education, the government established the National Mission on Education through ICT (NMEICT), which will help in the manufacture of skilled workers for the Make in India campaign. The current honorable prime minister of India frequently speaks about "Digital India" and "Make in India." The landscape of higher

education is changing significantly as a result of the digital revolution.The Union Ministry of Human Resource and Development has taken up the following novel initiatives to revolutionize Higher Education scenario in the near future:

- Swayam and Swayam Prabha
- National Digital library
- ShodhGanga
- E-Shodh Sindhu
- e-PG Pathshala

SWAYAM
(study webs of active-learning for young aspiring minds)

SWAYAM is an Indian government portal that offers free open online courses (MOOCs) to college and university students seeking education.

• In order to provide a coordinated stage and free access to online courses covering all advanced education, high school, and skill sector courses, the Ministry of Human Resource Development (MHRD) (now the Ministry of Education) of the Government of India created the SWAYAM program under Digital India. The Indian president, Pranab Mukherjee, introduced it on July 9, 2017.

• The SWAYAM platform, which offers classes from ninth grade to post-graduation, is accessible to everyone for free. It makes it possible for teachers at centrally sponsored institutions, like as IITs, IIMs, IISERs, etc., to provide education to students.

• SWAYAM has offered 11772 courses in total till date. According to the Department of Higher Education (India), over 4 crore students have enrolled in the various courses offered on SWAYAM, and there are over 1.21 crore unique users and registrations on the SWAYAM platform.

• There are currently 859 elementary school-level Indian Sign Language videos available on PM eVIDYA DTH TV channels. This is in line with the 2020 National Education Policy, which emphasizes the necessity of creating State and National Curriculum resources that are accessible to children with hearing impairments.

• With Microsoft's support, the Ministry of Education and the All India Council for Technical Education (AICTE) collaborated to build SWAYAM.

"Study Webs of Active-Learning for Young Aspiring Minds" is summed up as SWAYAM.

SWAYAM PRABHA

SWAYAM PRABHA is a set of 40 DTH channels that use the GSAT-15 satellite to broadcast top-notch educational programs around-the-clock. Students can select the time that works best for them because there will be fresh material every day for at least four hours, which will be repeated five times. Channels are uplinked from Gandhinagar's BISAG-N. IITs, UGC, CEC, and IGNOU are the providers of the contents. The INFLIBNET Centre maintains the web portal.

NATIONAL DIGITAL LIBRARY

The Indian government's Ministry of Education is funding the National Digital Library of India (NDLI). The most significant project for the development of the government's National Mission in Education through Information and Communication Technology (NMEICT) has been established by the Indian Institute of Technology, Kharagpur. It is a one-window platform that offers educational materials to all kinds of users to access e-learning and education. It offers users of all demographics with access to digital repositories from India and throughout the world. The NDLI integrates content from various national and international sources, including books, theses, audio-video lectures, journals and Open Educational Resources (OERs), to provide access to educational resources across a variety subjects and academic levels. Out of 452 languages, NDLI offers access to nearly 100 million items in 39 Indian languages.

SHODHGANGA

The term "Shodhganga" refers to the digital archive of Indian Electronic Theses and Dissertations that was established by the INFLIBNET Centre. The INFLIBNET Center hosts and maintains an archive of Indian intellectual output known as Shodhganga.DSpace, an open source digital repository software created by MIT (Massachusetts Institute of Technology) in collaboration with Hewlett-Packard (HP), is used to build up the Shodhganga@INFLIBNET. Internationally accepted interoperability standards and protocols are used by the DSpace. Researchers can upload their Ph.D. theses on Shodhganga and make them publicly accessible to the whole academic community. Researchers' electronic theses and dissertations (ETDs) can be captured, indexed, stored, shared, and preserved by the repository.

e-SHODH SINDHU

The Ministry of HRD (now known as the Ministry of Education) formed e-Shodh Sindhu by combining three consortium initiatives—the INDEST-AICTE Consortium, NLIST, and the UGC-INFONET Digital Library Consortium—on the advice of an Expert Committee.The e-ShodhSindhu will continue to offer its member institutions, which include centrally-funded technical institutions, universities, and colleges covered by 12(B) and 2(f) Sections of the UGC Act, both current and archival access to over 10,000 core and peer-reviewed journals as well as a number of bibliographic, citation, and factual databases across multiple disciplines from many publishers and aggregators.

II. AIMS AND OBJECTIVES

The primary goal of e-Shodh Sindhu: Consortia for Higher Education E-Resources is to give academic institutions cheaper subscription prices for high-quality electronic resources, including as full-text, bibliographic, and factual databases.

The following are the main goals and objectives of the e-Shodh Sindhu:

- Establishing e-Shodh Sindhu: Consortia for Higher Education E-Resources by enhancing and fortifying the services and initiatives provided by three Consortia financed by the MHRD;
- Create an impressive library of e-books, e-journal archives, and e-journals with permanent access;
- Through awareness and training initiatives, track and encourage the use of e-resources in participating Indian universities, colleges, and technical institutions;
- All educational institutions should have access to subscription-based academic materials, such as e-books and e-journals;
- Granting access to open access scholarly materials via subject portals and subject gateways;
- close the digital divide and transition to a society that is data-rich;
- Give other organizations, such as open universities and MHRD-funded institutions, access to specific e-resources that are not covered by current consortiums;
- Take on extra tasks and services that need a platform for collaboration and aren't being carried out by current consortiums; and
- Electronic books and journals are the main components of the National Electronic Library that is being developed.

e-PG PATHSHALA

The UGC is carrying out e-PG Pathshala, an MHRD program under the National Mission on Education through ICT (NME-ICT). Subject matter experts from Indian universities and other research and development institutions have created high-quality, curriculum-based, interactive e-content in 70 subjects covering all fields of arts, natural & mathematical sciences, social sciences, fine arts and humanities and languages . Content and its quality are the most important aspects of the educational system. Each subject has a team consisting of a multimedia team, language editors, content authors, content reviewers, paper organizers, and the primary investigator.

III. CONCLUSION

As we enter the twenty-first century, this study seeks to explain ICT-based teaching and learning in higher education. Institutions of higher learning play a significant role in the community and can be seen as role models for society as it works toward sustainable development. Higher education should consider its role in building an infrastructure that supports and promotes lifelong learning processes in addition to critically evaluating the learning environments and processes that students go through. The widespread use of ICT necessitates flexible attitudes and skill sets. ICT integration in higher education changes how teachers and students learn and enhances the development of higher order abilities like working together across time and location and solving challenging real-world issues. The adoption of ICT is a sign of a new era in education. Regardless of time or place barriers, ICT makes education accessible. In ICT, the student is actively involved and emphasizes independent, adaptable, self-directed, and interactive learning. These days, the teacher's job is to promote learning. The educator must give students access to technology in order to support their study. The decentralization of education will eventually result from ICT-enabled education, which also has the potential to transform Indian higher education.

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