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## **TEACHING AND LEARNING USING TECHNOLOGY**

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### **Abstract**

*Education may be defined as a process of giving or receiving systematic information, especially in school/ University. It may also be said as the action or process of teaching someone or Learning and gaining knowledge. Though computers are available in the classroom from early 1990's, the use of it to obtain meaningful learning outcomes from the learners is lacking. The 21st Century has witnessed a leap and bound growth in the Information Communication Technologies (ICT) which has completely changed the learning and teaching process of today than it existed five years ago. This paper throws light into the various teaching and learning technologies for obtaining necessary learning outcomes with special context to the Indian scenario and the explains the initiatives of the Government of India for Digital Education.*

**Keywords:** *ICT, IT, Digital Education, E-Learning, OER*

### **Introduction**

In today's world information and communication technology (ICT) is a key parameter for economic development. The IT sector has helped to scale up India's image to a global IT sector and has been a driving force for higher education. In the year 2013 the revenue of the Indian ICT sector was valued at USD 108 billion and the same is expected to reach the USD 225 billion by the year 2020. The technological advancements in the Indian IT industry is currently at the peak of its technology revolution with the convergence of cloud computing, social media, and Big Data analytics. Earlier, technology was helping businesses transform whereas today, the technology is leading business transformation to next level. Significantly, 45% of India's population is under 25, which should boost computer and IT usage.

ICT can be effectively utilized to get better outcomes for the education sector. Education here includes traditional face-to-face, open and distance, online, and part-time education. There is a wide range of applications of ICT in the real world which are unlimited. ICT can play a great role in both formal and non-formal system of education. Teaching is imparting knowledge or skill whereas learning is skill acquisition and increased knowledge. The huge population of India can be effectively reached by the usage of ICT. Recently there has been a paradigm shift in the curriculum where teacher acts as a facilitator or a guiding factor in a student-centered learning environment. In a Student-centered learning environment, the focus is on the student's needs, their abilities, interests, and learning styles with the teacher as a facilitator of learning. Here students are the sole responsible participants in the learning process. In Conventional education, the teacher has the key role whereas in case of ICT based education, various ICT tools are supplemented to make the teaching-learning process effective.

### Tools Used For ICT Teaching And Learning

Worldwide research has shown that ICT can lead to improved student learning and better teaching methods. A report of the National Institute of Multimedia Education in Japan, proved that, an increase in student exposure to educational ICT through curriculum integration has a significant and positive impact on student achievement, especially in terms of Knowledge Comprehension, Practical skill and Presentation skill in subject areas such as mathematics, science, and social studies.

Broadly, ICT in education can be defined as “diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information”. The technologies includes the use of computers, the Internet, radio and television, and telephone communication etc. It should be understood that information and communication or ICT singularly does not generate learning. Rather, it is a tool that can be effectively utilised to enhance, improve and complement learning-skills already in use that is the conventional methods of pedagogy that have been used so long.

Until the end of 20<sup>th</sup> century, the teaching – Learning process was struggling for the integration of Technology into it, whereas the dawn of 21<sup>st</sup> century, the focus has shifted to Technology – enabled teaching/ learning.

### Technology Enabled Teaching/Learning – Merits And Demerits

Every system and Technologies has its own merits and de-merits with respect to the stakeholders. The merits of the ICT enabled Teaching-Learning process is: most of the time teaching through ICT uses images which improves the retentive memory of students. Through ICT, teachers can easily explain difficult instructions and ensure students' comprehension. Through ICT, teachers can create interactive classes and make the lessons more enjoyable, which could improve student attendance and concentration on the subject of study.

The demerits of this type of teaching-learning process is that setting up the devices can be very troublesome, it may at most of the time too expensive to afford, and it will be hard for teachers to use the technology with a lack of experience using ICT tools.

### The Technologies Used

The process of teaching and learning takes place by the use of various types of technologies. The list of technologies are endless, here the major and emerging technologies used in India are discussed.

**(i) Audio/ Video Learning:** Among the first ICT resources to be used in India was the radio, where educational programmes started being broadcast as far back in 1937, known as the School Broadcast Project, simultaneously from Delhi, Bombay, Calcutta and Madras. However, due to the regional disparity in school curricula, this project was not successful in the long run.

Video-based training is one of the ICT enabled trends of today. This is due to increasing reliance on technology for training. According to an article in trainingmag.com, more than one-third of workplace education and training is technology-based. Videos are one of these technology-based training tools. They visually explain to learners what they need to learn. The content of the training are shown as pictures and words in Video-based training. Another reason why videos are an effective training tool is the pictorial superiority effect; as per this effect, the pictures and images are better remembered than just words and this indicates how videos can be effective. Videos are effective training tool for Soft skill development and Language teaching apart from its use for practical demos.

**(ii) E-Learning/ E-Content:** A learning system based on formalised teaching but with the help of electronic resources is known as E-learning. The Government of India (GoI) is a strong supporter of e-learning and the Department of Electronics and Information Technology (DeitY) has been actively developing tools and technologies to promote it. The teaching-learning process can take place either inside a classroom or out of the classrooms, the use of computers and the Internet for this process forms the major component of E-learning. E-learning can also be termed as a network enabled transfer of skills and knowledge, and the delivery of education is made to a large number of recipients at the same or different times.

**(iii) Smart Classrooms:** Smart Classrooms are technology enhanced classrooms that foster opportunities for teaching and learning by integrating learning technology, such as computers, specialized software, audience response technology, assistive listening devices, networking, and audio/visual capabilities. The Smart Classroom is physically built in a separate room of all-encompassing Computing Lab in which several video cameras, microphones are installed in it to sense human's gesture, motion and utterance. In a smart classroom, two wall-sized projector displays are mounted on two vertically crossed walls. These boards are called "Media Board" and "Student Board" separately. The Media Board is used for lecturer's use as a blackboard, on which prepared electronic courseware and lecturers' annotation are displayed. The Student Board is used for displaying the status and information of remote students, who are part of the class via Internet.

**(iv) Open Education Resources:** The term Open Educational Resources (OER) was first introduced at a conference hosted by UNESCO in 2000 and was promoted in the context of providing free access to educational resources on a global scale. Open Educational Resources (OER) are teaching and learning materials that are freely available online for everyone to use, whether you are an instructor, student or self-learner. The OER may be of the following forms, namely, full courses, course modules, syllabi, lectures, homework assignments, quizzes, lab and classroom activities, games, simulations, and many more resources available as digital media collections from all around the world.

**(v) Virtual Reality for Learning:** Virtual Reality (VR) has been used as education tools for some time in the applied fields such as aviation and medical imaging, and it has also been used in schools and colleges in the recent years. One of the main reasons why VR has been used for educational and training purposes is the support of high interactivity and the abilities to present a virtual environment that resembles the real world. With this technology, learners can explore and manipulate three-dimensional (3-D) interactive environment. However, VR is just an educational tool which can be used to support learning, which might not work for all kind of learning.

**(vi) Augmented Reality for Learning:** Augmented Reality (AR) is alike to virtual reality in the sense it provides learners a simulated environment. However in AR, the situation the learner is in is taken into account, and relevant information is superimposed on the learning context. The superimposed information has an impact on the visual and auditory fields of the learner, which enhances his sensory experience. AR goes further than the simulated learning experience VR offers. It brings the real and digital worlds together. It creates an immersive and interactive experience where the learner enjoys a multi-sensory experience. This creates a better learning experience. With AR, the learner can follow on-screen instructions, view layered graphics, see complex processes, or be given instructions to do a certain task. This makes the training experience more realistic.

**(vii) Gaming environment for learning:** The creation of gaming environment for learning or other activity is generally called Gamification. It is an educational approach which motivates the students to learn by using video game designs and game elements in their learning environments. The goal is to maximize enjoyment and engagement through capturing the interest of learners and inspiring them to continue learning.

### **Initiatives of the Government of India**

Government of India is keen and it focuses on digital education. Some of the State Governments in India, like Tamil Nadu and Uttar Pradesh, have made laptops mandate for all school children and the Government is supplying the same to the students at free of cost. This has created a massive rise in the demand for laptops and other computer hardware peripherals.

The use of technology to maximize the student learning experience is a vibrant area of interest across all tiers of global education. Technology enhanced-learning (TEL) is often used as a synonym for e-learning but can also be used to refer to technology enhanced-classrooms and to learn with technology, rather than just through technology.

The Government of India is keen to use the technological resources in helping its mission to make Higher Education accessible to all deserving students. In this regard, it launched its National Mission on Education through Information and Communication Technology (NMEICT) in 2009 to provide the opportunity for all the teachers and experts in the country to pool their collective wisdom for the benefit of every Indian learner and, thereby, reducing the

digital divide. It is obvious that emphasis on ICT is a crying need as it acts as a multiplier for capacity building efforts of educational institutions without compromising the quality.

NMEICT is not oriented towards school and college/university-level education, but also ambitiously aims at providing more than 50 crores working population with a one-stop solution for all their learning needs. One of the prime objectives of this mission is effective utilisation of intellectual resources, minimising wastage of time in scouting for opportunities or desired items of knowledge appropriate to the requirement.

There are many web portals and projects launched and implemented by the Government of India for promoting digital-education and to achieve the target stated in vision of India 2020 which states that, by 2020 at least 50% of University age learners will receive higher education. In the following sub-section, the various web portals of GOI will be enumerated.

**(i) NPTEL:** National Programme on Technology Enhanced Learning(NPTEL) is an initiative by seven Indian Institutes of Technology (IIT Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and Indian Institute of Science (IISc) for creating course contents in engineering and science. This portal contains materials for E-learning through online Web and Video courses in Engineering, Science and Humanities streams. The mission of NPTEL is to enhance the quality of Engineering education in the country by providing free online courseware. (<http://nptel.ac.in/>)

**(ii) Virtual Labs:** The objectives of the Virtual Labs portal is to provide remote-access to labs in various disciplines of Science and Engineering. Students of undergraduate level, post graduate level as well research scholars can make use of Virtual Labs. It shares costly equipment and resources, which are otherwise available to a limited number of users due to constraints on time and geographical distances. (<http://www.vlab.co.in/>)

**(iii) Spoken Tutorial:** The Spoken Tutorial project is the initiative of the ‘Talk to a Teacher’ activity of the National Mission on Education through Information and Communication Technology, launched by the Ministry of Human Resources and Development, Government of India. It provides audio and video tutorial and is developed as Open Source Software. (<http://spoken-tutorial.org/>)

**(iv) e-Yantra:** e-Yantra is an initiative to incorporate Robotics into engineering education with the objective of engaging students and teachers through exciting hands-on application of math, computer science, and engineering principles. An initiative by IIT Bombay that aims to create the next generation of embedded systems engineers with a practical outlook to help provide practical solutions to some of the real world problems. (<http://e-yantra.org/>)

**(v) Project OSCAR:** Project OSCAR (Open Source Courseware Animations Repository) provides a repository of web-based interactive animations and simulations, that we refer to as learning objects (LOs). These learning objects span topics in science and engineering at the

college level, and maths and science at the school level. Students and teachers can view, run and download these learning objects.

**(vi) E-Kalpa:** This project on 'Creating Digital-learning Environment for Design' also called 'e-kalpa' is sponsored by the Ministry of Human Resources, Government of India as part of the NMEICT. (<http://www.dsourc.in/>)

**(vii) Virtual Learning Environment (VLE):** It is an online environment of e-resources which caters to several disciplines at undergraduate and postgraduate level. It is an initiative of Institute of Life-Long Learning, University of Delhi. Started in 2012, VLE today boasts state of the art material that addresses emerging needs of a diverse student body, not only of Delhi University but other Universities as well. Drawing from several successful Moodle models, the multi-media interactive contents loaded on VLE are categorised discipline-wise. (<http://vle.du.ac.in/>)

**(viii) E-Pathshala:** E-Pathshala is a portal jointly initiated by Ministry of Human Resource Development, Government of India and National Council of Educational Research and Training launched in November 2015. It provides school student's access to e-text books, supplementary books and other e-resources like audios, videos, interactive, question banks etc. (<http://epathshala.nic.in/>)

**(ix) Ekalavya:** The ekalavya portal aims at a free exchange of knowledge and ideas, by placing all the relevant academic material in the Open Source, thus making a considerable contribution to society. It is envisaged that, the ekalavya project will become an all-encompassing activity over the years, using IT effectively for education. It aspires to build large collaborative communities where seekers/learners are matched by the providers of education. (<http://ekalavya.it.iitb.ac.in/ekalavyaHome.do>)

**(x) SWAYAM:** Study Webs of Active-Learning for Young Aspiring Minds Making (SWAYAM) is an instrument for self-actualisation providing opportunities for life-long learning. Here learner can choose from hundreds of courses, virtually every course that is taught at the university/college/school level and these shall be offered by best of the teachers in India and elsewhere. If a student is studying in any college, he/she can transfer the credits earned by taking these courses into their academic record. If you are, working or not working, in school or out of school, SWAYAM presents a unique educational opportunity to expand the horizons of knowledge. It is a MOOCs (Massive Online Open source Courses) of India which ranges from Certificate level to Post graduate level Programmes. (<https://swayam.gov.in/>)

## Conclusion

The use of Technology in Education (both teaching and learning) will empower learners for self-growth and higher quality of living. The teachers and the learners are to be given awareness about the existence of large number of avenues for their self-appraisal which in turn will uplift the society and the Nation as a whole. Learning will become an integral part of instruction at all

levels; Virtual classroom and self-learning (using networks and websites) will get strengthened in India. Educational management systems will become more sensitive, open, transparent and learner friendly and will focus on to provide academic support to students. By utilising all the facilities and resources, the overall vision of Education – 2020, to create a learning and knowledge society will become a fact and India will become one of the developed Countries in the World.

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