Impact of ICT on Various Dimensions of Higher Education

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ABSTRACT:

Information and Communication Technology (ICT) has integrated the world and changed the entire global education scenario. ICT tools and techniques enhanced teaching and learning, scientific research and governance in the institution. For ICT, we need infrastructure, internet connectivity, digital equipment, secure platform, digitally competent and confident educator. In this article attempt has been made to highlight the issues related with the effective implementation of ICT in all levels of higher education.

Key words: ICT tools, Smart education, online education,

Inroduction:

The use of Information and Communication Technology (ICT) has great potential in improving the quality of education imparted and widening the access of education throughout the country. ICT involves the utilization of technological tools that can support teachers to be innovative and effective in teaching while allowing students to learn at their own pace. The development of ICT enables learners to learn more effectively, efficiently, flexibly and comfortably. The presence of ICTs has expanded exponentially and touched virtually all dimensions of higher education. There are many different types in which ICT has been envisaged as a medium for teaching and learning included computer assisted learning, web-learning, computer classes, online training, distance education, e-learning, virtual learning, digital training etc. The open educational resources movement has picked up significant momentum, providing free access to courses, curricula and pedagogical approaches not available locally. The role of the teacher in the classroom is being transformed to an instructional manager helping to guide students through individualized learning pathways, identifying relevant learning resources, creating collaborative learning opportunities and providing insight and support both during formal class time outside of the designated 50 minutes interaction period. In almost all the colleges under different universities has started computer education courses such as BCA, MCA, B.Sc. (IT) and M.Sc. (IT) etc in their regular curriculum. The ICT has been organized in different courses according to the goal, purpose and area of applicability. Smart education is a new paradigm in global education[1]. In smart education, it is important to monitor learning process and to make it more efficient. During COVID-19 global crisis, professors of university accept the challenge of strengthening their ability to handle ICT tools. The professors having

previous experience to support online teaching did not reach 50%[2]. However, they recognize and accept the potentials of ICT and consider its positive effect on teaching and learning during 21st century.

Purpose And Benefit Of Using Ict Resources

Countries across the world are using ICT in facilitating information, dissemination and communication in all areas of education and training. Following are the purposes of using ICT resources by students.

* For research purpose (Thesis/dissertation/ projects/articles).
* For keeping up-to-date subject information.
* To gain current and general knowledge information.
* For seminar/workshop/seminar/conference presentation.
* For communication (to exchange ideas)

The use of computer and digital technologies is usually more productive when it supports collaboration and interaction, particularly collaborative use by learners or when teachers use it to support discussion, interaction and feedback. Effective use of ICT can motivate students, make our classes more dynamic and interesting and renew teacher enthusiasm as they learn new skills and techniques. Following are the benefits of ICT in education:

* Enable greater learner autonomy,
* Enable tasks to be tailored to suit individual skills,
* Enable students to demonstrate achievement in ways which might not be possible with traditional methods,
* Unlocks hidden potential for those with communication problems.

ICT Tools:

There are various available which can be utilized for the knowledge creation and dissemination in the modern world. Tools include Interactive smart board, Computer, Projector, Television, Video conference, Wi-Fi/LAN, Smart classrooms, e-library, College website etc. Personal ICT resources are mobile/tablet, PC/ laptop, Net connectivity etc. Tablets loaded with math apps and e-text book are used to access real time information, receives instruction, record measurements and conduct research. Web based tools enable student registration, track learner progress, record test scores and indicate course completion. It enables parents to review the students' performance online. Plagiarism detection system is available to check of plagiarism of text. Online communication tools are available for collaborative work. Virtual classroom software system is available for interactive learning environment to students with a computer and internet connection. Voice over Internet Protocol (VoIP) enable voice transmission across the internet. Podcasting is a method of publishing audio files via the internet. Blogs are web-based log book posted by an author or group of authors. The student and teacher must have efficient access to digital technologies and the internet in their institution. High quality, meaningful and culturally responsive digital content must be available for teachers and learner. Teachers must have knowledge and skills to use the new digital tools and resources to achieve high academic standards. ICT tools promotes multimedia simulation of good teaching practices, teacher to teacher collaboration and help in overcoming teacher isolation [3].

ICT Based Smart Learning Environments:

With the rapid development of new technologies and emergent of new pedagogies in digital age, increasingly flexible and efficient learning methods for students are developed. Smart learning environments are defined as physical

environments that are enriched with digital, context-ware and adaptive devices to promote better and faster learning. Intelligence technology plays an important role in the construction of smart educational environments. For hardware, 'smart' refers to the smart device much smaller, more portable and affordable. For software 'smart' refers to adaptive and flexible. Learning can take place anytime and anywhere via utilization of smart devices.

Smart education describes learning in digital age, has gained increased attention. Mobile devices are becoming smaller and smarter and more affordable. Most students use smart mobile devices and digital resources for communications, learning, and entertainment in everyday life. Mobile learning takes place anytime anywhere with the limitations of time, location or environment. Also, other technologies, such as cloud computing, learning analytics, big data, internet of Things (IOT), wearable technology etc promote the emergence of smart education. Cloud computing, learning analytics and big data, which focus on how learning data can be captured, analyzed and directed towards improving learning and teaching, support the development of personalized and adaptive learning. With these adaptive learning technologies, learning platform reacts to individual learner data and adapts instructional resource accordingly based on cloud computing and learning analytics, and it can leverage aggregated data across mass learners for insights into the design and adaptation of curricula based on big data. The IoT and wearable technology support the development of contextual learning and seamless learning. The IoT can connect people, objects and devices. Smart learning environments supported by technologies should not only enable learners to digital resources and interact with the learning systems in any place and at anytime, but also actively provides them with the necessary learning guidance, supportive tools or learning suggestions in the right place, at the right time, and in the right form. There are many different types of technologies used to support and enhance learning which include both hardware and software. Hardware include those tangible objects such as interactive whiteboard, smart table, e-bag, mobile phone, wearable device, smart device, sensors which using ubiquitous computing, cloud computing, ambient intelligence, IoT technology etc. Software includes all kind of learning systems, learning tools, online resources, educational games which using social networking, learning analytics, visualization, virtual reality etc.

The advancement of computing technologies leads smart computing to a new dimension and improves the ways of learning. The tri-tier architecture of smart learning environments is essential which includes cloud computing, fog computing and swarm computing. The cloud computing provides software as a service. It deploys groups of remote servers and software networks that allow centralized data storage and online access to computer services and resources. It is the infrastructure of smart learning environment and provides the platform, virtualization, centralized data storage, and educational service in education. Using cloud computing, the smart learning environments can realize smart pull, smart prospect, smart content, and smart push. Fog computing is a highly virtualized platform that provides compute, storage, and networking services between end devices and traditional cloud computing data centers. Through the features of for computing, smart learning environments can realize real time interaction, location-awareness, large-scale sensor networks, supporting for mobility and so on. Swarm computing, is also called environment –aware computing can execute on swarms of smart devices and the networks of sensors due to ubiquitous sensing. In tri-tier architecture, the swarm computing support

awareness, the fog computing support analysis, alternatives, and the cloud computing support actions and auditability.

ICT In Administration And Management

The administration and management in higher education system need ICT support to coordinate and control all activities in transparent ways[4].

1. General Administration

The notices and agenda to staff should be send through e-mails rather than printing and distributing them. The submission of lesson plan through email. All teachers should create a class web page. Admission should be through web enabled services. Fee submission through online payment gateway. Answer script evaluation through digital evaluation system rather using manual checking. Usage of computer for recruitment and work allotment of staff in the institution. Automation of attendance and leave management of staff members in the institution. Usages of electronic media for performance appraisal. Communication with staff using e-media. E circulars from the institution regarding official matters. E-kiosks are available in the institution. Microsoft Word are generally used to write letters, proposals, reports etc. Microsoft PowerPoint are used to make presentations either directly using computer screen or data projector.

2. Financial Management

ICT has increased and renovated financial structure both in quality and quantity. Microsoft Excel are used to analyze financial information. Accounting packages such as Tally and Oracle are used to manage an institutional account.

3. Student Administration

This may include admission enquiry by students, applying for admission through electronic media, registration /enrollment using computers, course allotment and availability of information like time table, class schedule in electronic form and attendance monitoring maintenance through e-media. The use of ICT in admission process, maintenance of students personal and other academic records, submission of class assignment and projects, monitoring evaluation and communication with the stakeholders. Student administration involves various activities commencing from admission process to learning activities till processing of results and performance analysis. The integration of ICT into this process enhances the overall admission activities in higher education institutions.

4. Examination System

All higher education institutions are under a process of change from manual to ICT based examination system. This change will minimize human intervention and bring transparency, reliability and efficiency in the university examination system. Trends for seeking online applications for examinations and conducting online examinations have made the system very simple and cost effective. Online tests are objective one and easy to evaluate which further make it possible to declare examination results without any delay. It will be easy to monitor the whole examination process and further verification of the degrees and marks list directly by the appointing authorities. ICT based system will reduce consumption of papers and printing.

5. Library Services

The library users can access information of various types such as online databases, e-journals, e-books, government publications digitally through networking system. Online Public Access Catalogue (OPAC) is the computerized version of library catalogues. It provides access to the catalogues of a library on the local intranet, extranet or even the internet. The use of ICT devices such as computer, bar code scanners its software has been very useful in performing the routine operation in circulation work. The emergence of internet as

the largest repository of information and knowledge has changed the role of traditional library and shifted from physical to virtual service environments.

Government Initiatives

Government of India has initiated programmes to achieve the three cardinal principles of education policy viz, access, equity and quality. Under a new initiative Annual Refresher Programme in Teaching (ARPIT), the faculty development Programme (FDP) of higher education faculty is offered through MOOCs under SWAYAM platform, for training and to expose the teachers to technology enabled learning. SWAYAM Prabha would enable to deliver e-education in a most cost effective and inclusive manner. The National Digital Library of India (NDL) project can provide a single window access to learners for e-contents/resources. National Academic depository (NAD) is an online store house of academic awards (degree, diplomas, certificates, mark sheets etc) lodged by the academic institutions in a digital format. Students can now access their academic awards online from anywhere and at any time. MHRD provide plagiarism detection software to all the universities to facilitates easy detection of plagiarized content in the academic and research works including articles in Journals and conference proceedings, chapters in books, theses, research reports, assignments, project work lecture notes, e-content /e-text for MOOCs etc. The Department of Higher Education, Ministry of Human Resource Development (MHRD) has undertaken many initiatives under 'National Mission on education through Information and Communication Technology (NMEICT) project. 'Study Webs of Active-Learning for Young Aspiring Minds' (SWAYAM), SWAYAM Prabha, National digital library (NDL), National Academic Depository (NAD), e-Yantra, spoken tutorials, virtual labs and many initiatives are helping the students as well as teachers across India in their up-skilling as well providing them quality educational resources. These efforts not only impart quality education and accessibility but also excite creativity and innovation in a billion minds, particularly young students, catalyzing them to attain their true potential in building the nation.

Distance Education

Distance education programme, which are very popular these days gained momentum because of ICT. Distance education is being seen as one way to meet the demand of higher education. Distance education represents an area of enormous potential for higher education system around the world struggling to meet the needs of growing and changing student populations. The distance learning landscape has been transformed by ICT, allowing the real growth in numbers and types of providers, curriculum developers, mode of delivery and pedagogical innovations. This has improved enrollment and good performance by student. The growth of Massive Open Online Courses (MOOCs) has pushed some universities into online learning environments.

Misuse and Negative Impact Of ICT

One of the major impacts of ICT in education is moral decay. These include access to inappropriate material, violation of personal privacy, and being the recipient of sexual predation, pornography, harassment, stalking or scams and dissemination of harmful or abusive material. Stealing of software or the use of unlicensed/ pirated software are the major concern. It is exceedingly easy to do "cut and paste" without referencing the source and without paying attention to copyright laws. This is serious ethical issue among the education system with both student and teaching staff using other peoples work as their own. They are making illegal or unethical use of ICT facilities such as cyber crimes and hacking

damaging, destroying, stealing, and illegally using ICT facilities and files that belongs to others. Plagiarism has increased resulting in decline of educational standard. The students highly dependent on ICT lose their analytical skill, mathematical skill and judgement skills. Several unwanted, baseless and fake information are on rise at internet. Due to increase in technology human relation are lost and people are forgetting their responsibilities and becoming opportunist. ICT fails to solve cultural and social sensitive problems. It widens the knowledge gap and minimizing the digital gap.

New Emerging Technologies

Finally, many new frontline technologies like artificial intelligence, Machine learning, autonomous systems, Cognitive Systems, etc are emerging and these are going to give many new opportunities for all of us to further improve the quality and accessibility in higher education. Artificial intelligence (AI) has the potential to further personalize the student learning experience by enhancing online and adaptive learning technologies. The role of AI in the education sector is no longer limited as aspects like speech recognition, problem solving and planning. AI facilitates automation of administrative tasks like students grading, the addition of smart content in the curriculum, as personalization of the teaching process. Researchers have developed the foundations for algorithms that could allow AI to correct errors in real time without affecting existing skills. Quantum computing can generate solutions to complex problems with unprecedented speed and sophistication in a wide range of fields. Security of information and communication networks can improve through quantum computing. Mixed reality is the fusion of real and virtual worlds through immersive technologies including virtual reality (VR) and augmented reality (AR). At present applications are largely focused on educational visualizations.

Conclusion:

The application of ICT is unavoidable for the sustainable development of the educational establishments. The institution must focus on developing ICT infrastructure in institution but it requires high investment. During unpredictable days such as flood, COVID-19 lockdown, climate change or any other natural calamities ICT will support educational community in various ways. Accessibility and affordability of ICT tools are major concern for the rural youth of the country who are not that much technology savvy.

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