Pertinence of Information and Communication Technology (ICT) in Teaching-Learning process in the context of 21st century Digital Era

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Abstract: Information and Communication Technology (ICT) has made remarkable improvement in the field of Education. With the help of ICT, classroom study has shifted from teacher centered pedagogical approach to learner centered approach and offers to foster interactivity, more collaborative approach and inclusivity as well. Tools and applications of ICT are like online classroom system, Learning Management Systems, MOOC, SWAYAM, digital libraries, Google meet to YouTube every single platform will positively manage to study, learn, grow and compete with global skills. ICT expands innumerable opportunity for teachers to make their content rich, interesting and effective to deliver in classroom situation. Assessment and evaluation process can be smoothening through ICT tools like Blackboard, Socrative, Kahoot, Mentimeter. In addition to these teachers can enroll in professional courses and make their learning as per their convenient time and space. Inclusive education can be highly benefitted from newly added Assistive and Adaptive technology. JAWS, Voiceover, NVDA tools are essential for Screen reading, speech-to-text for student with disability. Learning becomes easier and comfortable and specified for each individual from online tools and apps. Despite of all these advantages several challenges and barriers are also exist such as digital divides, inadequate infrastructure, lack of training to use ICT properly, resistance to change and deal with digital culture along with delayed adoption of ICT. However Government has already taken initiatives like e-Pathshala, NISHTHA, DIKSHA platform to provide equal opportunity for all rural and urban learners. The importance of ICT not only limiting in providing tool and applications but in creating equitable, innovative and effective digital culture from Education to human life for betterment of living.

Keywords: ICT, Teaching, Learning, ICT integration, Digital age, SWAYAM, MOOC, LMS, Digital Culture.

"Technology will never replace great teachers, but technology in the hands of a great teacher can be transformational."—George Couros.

Introduction

In this 21st century digital era the educational practices have faced a rapid transformation due to advancement of Information and Communication Technology (ICT). It deals with digital infrastructure and devices including computer, laptop, tablet, mobile, microphone, printer, scanner, Wi-Fi, projector, Google chrome, telegram, YouTube, MOOC, SWAYAM, e-Book, whiteboard, Google classroom, Google meet, LMS and many more. The National Education Policy (NEP) 2020 has stressed and mentioned on integration of ICT for the transformation and Digital literacy in Indian Education system. During past process of teaching was com-

pletely dependent on Guru and rote memorization. The place of Guru stands supreme. No clear précised curriculum was mentioned before entering into studies. With time and space, a new system entered within our education system regarding course details, specialization and time duration. Education has changed its wings with many transformational stages and this 21st century digital age is one of the finest. Now teachers and learners could be more interactive and get time bound studying options. Learners could easily access their courses as per their convenient time and space with the help of e-book, internet, smart phones, tablet and computers. In case of higher studies from teachers to learners at any stage could publish and present research papers and attend seminar across the globe. Most importantly inclusive education has finally received its own benefits with the help of assistive technology where learners get digital translator, screen readers and software like speech-to-text and many more. This study helps us to understand all the advantages, tools and challenges of ICT during teaching-learning process.

Concept of ICT:

Technology is not a new term rather it is a modified version of Audio from Radio, audio-visual from televisions and classroom overhead projectors used for educational purpose. However, the constant development of technology from the late 20th century to present day has reached to next level. The UNESCO World Declaration on Education for All (1990) has mentioned that role of ICT is the most crucial tool to expand accessibility and quality in education. In this 21st century to achieve the SDG (sustainable development goal) goal 4 inclusion of ICT in the field of Education is an essential part.

ICT means Information and Communication Technology. It refers to include complete usage of technology in the field of Education. From teaching learning to daily life everywhere ICT plays a crucial role. ICT can be divided into two parts software and hardware technology. Hardware encompasses Smartphone, Computer, Tablet, Projectors. Software includes Learning Management System (LMS), virtual labs, different digital learning apps, digital libraries, MOOC (Massive open online courses), SWAYAM in India etc.

Importance of ICT in Teaching-learning process:

ICT is an essential tool to enhance access in Education especially from teaching to learning. It makes bridge the gap of both socio-economic and geographical. ICT creates opportunity for all specially for rural and remote areas students with the help of online teaching facilities and MOOC platform, e-book, digital library get to access high quality study resources and platform regardless of their area of living. In India SWAYAM offers free online courses for millions of learners which are an extra ordinary mile stone achievement to go with ICT at anytime and anywhere.

ICT helps to promote the student centered learning instead of traditional method of rote memorization as mentioned in NCF-2005 (National Curriculum Framework). ICT helps to make the study interactive and inquiry based learner. It also helps to foster deep understanding along with individual needs with the help of simulations, new educational games, different adaptive software and educational apps.

ICT plays crucial role for Teachers to make lesson more attractive and effective with the help of diverse resources and multimedia content. Teachers can also make professional development with the help of online course according to their convenient time and space. Both in the field of online and offline class Teachers

could deliver high level content for making teaching-learning process more effective. LMS like Canvas, Open edX, Edmodo, Google Meet, Zoom, Kahoot, Mentimeter, Educaplay, Jamboard can be usable for making teaching leaning process more innovative.

ICT enables effortless communication between teachers and students. Learning Management System helps to get real time feedback and collaborative learning environment. With the help of Google workspace students can work together on their project. In this 21st century Skills like critical thinking, digital literacy and problem solving are the most effective skill requirement for today's learners. ICT provides immense of opportunity for the learners to develop and refine all these competencies and make them prepare to deal with global workplace. ICT also includes Inclusive Education for the needs and address to all differently-able learners with assistive technologies. ICT breaks the barriers and helps to promote equity by using screen readers, digital translator and voice recognition app to deal with the difficulties of students.

Role of ICT in Teaching:
ICT has the most crucial role in the field of Teaching and they are as follows:

- **To ameliorate content:**

At present scenario Teachers are consider as content creator and digital facilitator. With the help of Digital projectors, interactive white board and multimedia presentation like Animaker (to create animated media) or Plotagon (to create animation), teachers could easily gain the attention of students and make them engage during class. For making easy concept teacher could use visuals and animations to better retention and understanding of students. Those who have desire to go for higher education they could use free access from Google scholar and Shodhganga to download and read thesis and make their own paper by finding gap from literature review. To present and create paper for publications teachers can access Google to find and read more papers on their related topic to gain better understanding and clarity.

- **Assessment and Evaluation:**

ICT encourages using varieties of platform like online quizzes, Moodle (open source LMS), Google classroom (online testing platform), Blackboard (remote assessment tool), Mentimeter (real time polling and feedback tool), Quizlet (mobile friendly test and quiz app), Socrative (digital assessment tool in real time), Kahoot (to create quiz and survey learning assessment), mind mapping software, online bulletin board, surveys and creating interactive quizzes. All these platforms are important to understand the clarity of students learning and help to make more efficient study for future learning. ICT helps to assess of learners far better than time consuming traditional form of taking examination. Google form is another essential to get feedback about students learning and evaluation process as a form of feedback.

- **Innovative pedagogy:**

For the development of constructive approaches in teaching ICT plays vital role. Flipped classroom and Blended learning help to make the learners ready to deal with classroom session due to their already existing content information provided before entering class. As a result student can be interactive and become problem solver. For immersive experience in learning introduction of Gamification (help to learning turn into games) and VR can be effective.

- **Professional development:**

ICT helps to make teachers more passionate and provide world class platform to make them efficient with the help of multiple training and professional development courses according to own time and space. Platform like SWAYAM and MOOC provide thousands of courses for in-service and Pre-service teachers to deal with the 21st century global digital era. Teachers with the help of ICT can guide themselves to become knowledge constructors rather just merely as content delivering. It is the best era for teachers to represent them as facilitators instead of transmission.

Role of ICT in Learning:

- **Active engagement:**

From learners' perspective ICT plays vital role with the use of multimedia resources for attracting content creation and making effective delivery for better engagement during virtual classroom situation. Blended learning helps to make study easy and interactive during classroom situation. Online poll can help to make the mind of learners more active to provide right and fast answer during studies. ICT makes the classroom engage active and interaction will always possible. Learners could ask their doubt on app and get solutions either immediate or later in solution box. As a result learners could develop their skill of learning and implement in their related field.

- **Collaborative learning:**

From knowledge sharing to join in seminar can be easily possible by online forums and group projects. Google classroom (to create, manage and organize assignments) and Padlet (a digital bulletin board helps to share content), Zoom (video conferencing app), Slack(to foster collaboration via direct channel), Miro (a virtual whiteboard for real time collaboration), Lumio (online interactive software for educational content), Trello (project management tool), Asana, Notion (tool for collaborative work) help to work together and create share and exchange innovative ideas and content regardless of socio culture and geographical location. Learners can easily connect with their teachers and peers to exchange ideas at anytime and anywhere. This helps to broadening own perspective without hesitation. In case of any presentation or seminar learners could get help from experts on global basis to make the field of studies broader.

- **Self directed and lifelong learning:**

With the help of e-book, PDF, digital libraries and online courses at different platform students and learners can easily access them beyond time and space. As a result those who are engaged in jobs or left study for some reasons and want to start or continue the journey again they are getting the opportunity to use these platforms. By using Smartphone or tablet any individual could use free videos from YouTube to their related topics. To gain knowledge or make expertise both free and subscription course are available for making learning more easily and convenient. Moreover, any individual can present their lecture or tutorial on global platform by own learning and guidance.

- **Inclusive education:**

With the help of assistive and adaptive technology those learners with disabilities could continue and learn their field of studies. All barriers can be removable if technology could be properly used. Those are unable to read they could use screen readers and speech-to-text software like NVDA, JAWS, VoiceOver, TalkBack etc.

Those who are not hear properly they could use software like Pro Fit, Genie 2, and Hear Suite etc. ICT has made a remarkable possibility in the field of Inclusive education. As result students who has any such difficulties in reading or listening now they could break barriers to access education as per their need and aspirations.

ICT tools:

ICT helps to create such environment to make teaching learning process in Education more engaging. Here some tools and applications are mentioning below:

- Social Media applications like Facebook, Telegram, Whatsapp, Twitter etc. all these applications are helpful to provide and collect information. By creating group communications can be more collaborative and effective.
- Learning Management system (LMS) like Blackboard Learn, Duolingo, LearnDash, OpenedX, Course Builder, Edmodo, canvas, Schoology and Moodle, Micro, Coggle, Popplet, MindMeister, x mind, Plotagon, Animaker, Big Blue Button, Google Meet, Zoom, Camtasia (video editing), Coursera, Wakelet(share online media), Survey monkey, Slido, Koha, Book creator, FOSSEE, Seesaw, Trello, Labster, Google slide etc.
- Interactive teaching and learning materials: H5P, Genially, Classcraft, Learninggapp.org, Interacty, Edmodo etc.

Challenges of ICT and ways to deal with them:

- **Digital divide:**

It is an unequal access for ICT resources and utilization. Many students have not the access of Internet connections due to their remote area locations. Many are not capable to purchase computer or Smartphone due to their lack of financial conditions. In addition to these social economic disparities and rural-urban gaps has made deep impact along of lack of proper infrastructure in school. During Covid-19 pandemic millions of students are excluded from online learning due to this digital divide. This gap has made the use of ICT in education with unequal quantity.

Solution: Educational institutions are needed to provide community learning centers. So that students can use ICT tools and applications as per their convenient time and space. Government and private organization must be collaborative to introduce internet network to rural areas for providing better service to all.

- **Cost of infrastructure:**

Proper infrastructure is another important aspect to implement ICT enabled digital study culture. Basically educational institutions need digital devices like computer, projectors, WIFI, high speed internet to create ICT enabled atmosphere. Most of the institutions are lacking all these facilities due to high maintenance cost and Govt. funding. Moreover lack of technical support also another hindrance to ICT enabled digital culture for effective teaching learning process.

Solutions: Both Government and Educational institution are conjugally need to invest for providing digital culture. Low budget digital devices can be included. Making partnership with private organization can help to develop digital culture.

- **Lack of technical skill:**

Teachers are the most important part to adopt digital culture in educational institutions. Many teachers have not proper technical skill to use and handle devices properly. Lack of training and enthusiasm for digital environment another challenges to deal. Many teachers are least bothered to use multimedia resources during classroom situations. Without professional training and creation of regular

monetization it might seem impossible to implement digital culture.

Solutions: Teachers are needed to enroll in professional course, training to develop technological skill and expertise to handle during classroom situations. Year basis training can be effective to gain and create technological atmosphere during teaching learning process.

- **Ethical issues:**

In this present time lack awareness about ethical practices for both teachers and students are in complete risk. From data privacy to misinformation to lack of digital skills directly lead them to make vulnerable exploitation. Misinformation is another challenge for developing digital culture in educational institutions.

Solutions: Most of the users are not aware ethical concerned regarding the utility of software, Smartphone and internet. Indian Government has made IT act 2000 to know and understand the law and deal with cybercrime.

- **Lack of ICT integration in pedagogy:**

ICT itself cannot create digital culture. It needs proper usages and it totally depends on integration with teaching learning process and strategies. Teachers are might not stressing on students interaction and problem solving approaches. Instead they are like to go with traditional methods of teaching. Lack of ICT integrated pedagogical approach towards studies is another essential factor to create digital culture in educational institutions.

Solution: Government and stakeholders are needed to aware about ICT integration with curriculum for developing awareness and skill about the utility of ICT. So both the teachers and students could connect with ICT in practical and theoretical way.

- **Over dependency on Technology:**

Over dependency is another issue where both teacher and students will unable to develop emotions, discipline, integration, respect and empathy. Face to face traditional method helps to create a strong bond between teacher and students with care, concern. Students will understand the values, morality and ethics during offline teaching learning process which may not possible to learn in online studies.

Solutions: Teachers are needed to provide offline assignment and project to work with peers as team work. Offline classroom can be an alternative way to deal with over dependency on technology.

- **Resistance for adopting ICT:**

Most of institutions are not fast enough to deal with ICT enabled digital study environment. Maximum teachers are still preferred to go with traditional method of delivering content. Not only teachers but also the policy makers and parents are also deeply accustomed with traditional method. In addition to these negative attitude, fear of technology and unable to trust on online process are huge disappointment for creating digital culture.

Solutions: Everything has its own advantages and disadvantages same way it needs to slowly adopt technology to make life and study easier. It is quite difficult to adopt ICT fully at the beginning but slow progress is always better than never. Teachers are needed to introduce ICT based content for making classroom interaction more effective.

- **Language barriers and health concerns:**

In the case of non English speaking countries and regions most of the people are not aware of this language. As a result they are not able to use gadgets or any

digital device properly. Where people are addicted with technology they are making their health poor. People are using mobile, YouTube, watching movies, scrolling continuously, listening music, using online shopping and are not aware of time. People spending hours in mobile scrolling and as a result people become lazy, hot headed, distracted and developing isolation from society.

Solutions: It is quite true that language has its own impact to use technology fully. Still users could understand from manuals to use the basic of technology. Those who use mobile and internet without any purpose they could travel without phone so that it helps them to deal with digital detox. Users must be concerned about their time and try not to over indulgence on technology.

Conclusion

In this present digital era role of ICT in teaching learning process cannot be deniable. ICT is inevitable in online teaching learning and self directed learning. ICT has given us enough space and no time bound to face difficulty for continuation of learning. ICT is blessing in disguise especially from and after COVID-19 pandemics. It is also true that users are growing and many students use internet and mobile aimlessly. It impacts on their social, personal and professional life. ICT has many challenges like proper infrastructure to delay adoption to late implementation in classroom situation to lack of proper training. But all these hindrance can be mitigated and solution is also mentioned in this study. ICT is the most powerful tool and application to use it anywhere and may continue work and study even outside of office, school, college and university hours. We can connect with our friends and family at anytime with the help of Internet. Effective utility of ICT can be blessings in all sectors of human life.

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