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Role of information and communication technologies in teaching: Learning process

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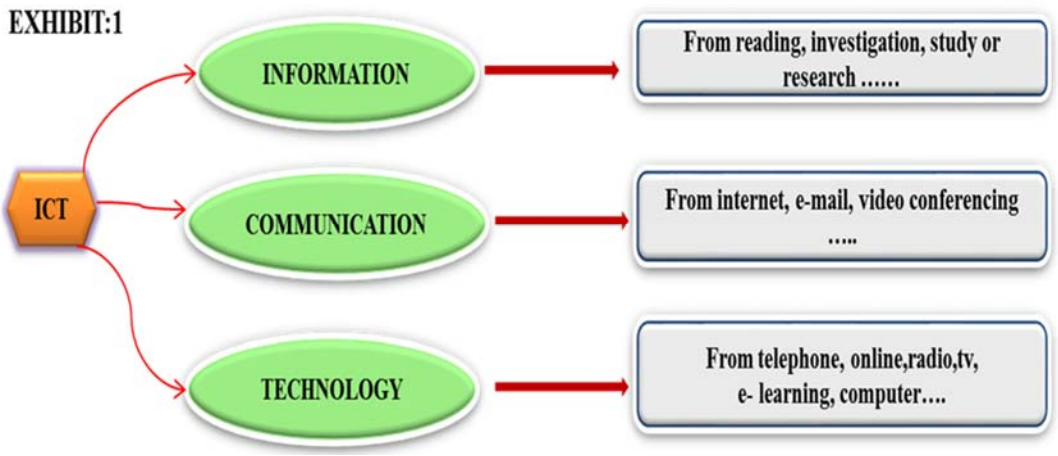
Abstract
"The competitiveness is powered by knowledge power. Knowledge power is powered by innovation. Innovation is powered by science and technology and technology is powered by resource investment" - Dr. A. P. J. Abdul Kalam, Former President of India.
Education is the only mean through which a society adjusts to its needs. Therefore, a society can never exist without education. Through education, the members of a society learn the skills to enrich, transmit and transform cultural heritage as well as existing social and scientific knowledge for the continued advancement of the society. The Information and Communication Technologies (ICT) is an umbrella term that includes many communication devices or applications, encompassing: radio, television, cellular phone, computer, and network hardware and software, satellite system and so on. When such technologies are used for educational purposes, namely to support and improve the teaching- learning process and to develop learning environments. Studying the obstacles to use of ICT in teaching – learning may assist educators overcome these barriers and become successful technology adopters in the future. However, the presence of all components increases the possibility of excellent integration of ICT in teaching – learning opportunities. Generally, this paper provides information and recommendation to those responsible for the integration of new technologies in teaching – learning process.

Keywords: ICT, Teaching – Learning, Innovation, Barrirers, Implementation

Introduction
The education has an important role in building and shaping the society. Education determines the standard form of society. The father of the Indian nation, Mahatma Gandhiji said "Basic education links the children, whether of the cities or the villages, to all that is process by the teacher. But technology is the most effective way to increase the best and lasting in India". So the quality education is a basic need of the society. The quality education helps to the nation for developing in all aspects by providing new thoughts, the ways of implementation of various technologies and so many such things. There are many methods using in the teaching- learning student's knowledge. Here comes the role of ICT in the education sector! Being an academician we cannot imagine education without ICT. Now a day, ICT (specially an internet) plays an imminent role in the process of integrating technology into the educational activities

ICT Defined
ICTs stand for information and communication technologies and are defined, for the purposes, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony.
In education, the use of ICT has become imperative to improve the efficiency and effectiveness at all levels and in both formal and non-formal settings. Education even at school stage has to provide computer instruction. Profound technical knowledge and positive attitude towards this technology are the essential prerequisites for the successful citizens of the coming decades.



Need of ICT for Teaching –Learning

ICT has provided society with a vast array of new communication capabilities and has fundamentally changed the way we live now. We find a world of difference in the practices and procedures of various fields such as medicine, tourism, banking, business, engineering, etc. as they operate now in comparison to how they operated two decades ago. In contrast, the impact of ICT in education in India, however, has been far less and slower.

The most fundamental cause seems to have been the deep-seated belief that teaching is an art or at best an imperfect science with no role of technology in the design or delivery of instruction. But now times have changed and the paradigm of education and learning has changed from art or science to technology-mediated instruction and learning. ICT can, therefore, be perceived as a big change agent for education.

In order to use technology to help achieve the goals of education in a better and more effective way, one has to be first of all clear about what our expectations are from the education system, what and how do we want our students to learn and what type of individuals our classrooms should produce - rote learners or those with an analytical mind having an in-depth understanding of the subject?

ICT, if used creatively, can make a big difference in the way teachers teach and students learn and can help students acquire 21st century skills like digital literacy, innovative thinking, creativity, sound reasoning and effective communication. ICT can help in enhancing the quality of education through blended learning by supplementing the traditional talk and chalk method of teaching. ICT-enabled education can also be a solution to the growing demand for enrollments in higher education in India and thus help increase the gross enrollment ratio (GER) which at present is very low (about 12%) as compared to the world average of 23%. In case of open and distance education (ODE) system where "Anyone, Anywhere and Anytime", that is, 3A's are the main philosophy, ICT-enabled education can do wonders that no one can imagine and help pave ways for the creation of virtual universities in the long run. ICT can also significantly contribute in efficiently managing the governance in the universities and colleges.

ICT in education is the need of the hour. It has the potential to provide solutions to many of the challenges higher education faces today. The common fear that ICT shall replace a teacher is totally unfounded. Realization now seems to be slowly dawning on the teaching community that ICT is primarily to empower them and not to replace them. ICT is, therefore, not to be feared, but to be embraced so as to empower our future generations by providing them high quality ICT- enabled education.

Objectives of ICT

The followings are the objectives of ICT implementation in teaching - learning:

- To implement the principle of life-long learning / education.
- To increase a variety of educational services and medium / method.
- To promote equal opportunities to obtain education and information.
- To develop a system of collecting and disseminating educational information.
- To promote technology literacy of all citizens, especially for students.
- To develop distance education with national contents.
- To promote the culture of learning at school (development of learning skills, expansion of optional education, open source of education, etc.).

To support schools in sharing experiences and information with others.

ICT and Teaching - Learning

ICTs are a potentially powerful tool for extending educational opportunities, both formal and non-formal, to previously underserved constituencies—scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus.

- **Anytime, anywhere**

One defining feature of ICTs is their ability to transcend time and space. ICTs make possible asynchronous learning, or learning characterized by a time lag between the delivery of instruction and its reception by learners. Online course materials, for example, may be accessed 24 hours a day, 7 days a week. ICT-based educational delivery (e.g., educational programming broadcast over radio or television) also dispenses with the need for all learners and the instructor to be in one physical location. Additionally, certain types of ICTs, such as teleconferencing technologies, enable instruction to be received simultaneously by multiple, geographically dispersed learners (i.e., synchronous learning).

- **Access to remote learning resources**

Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in libraries (and available in limited quantities) for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number of people. This is particularly significant for many schools in developing countries, and even some in developed countries, that have limited and outdated library resources. ICTs also facilitate access to resource persons, mentors, experts, researchers, professionals, business leaders, and peers—all over the world.

- **ICTs help prepare individuals for the workplace**

One of the most commonly cited reasons for using ICTs in the classroom has been to better prepare the current generation of students for a workplace where ICTs, particularly computers, the Internet and related technologies, are becoming more and more ubiquitous. Technological literacy, or the ability to use ICTs effectively and efficiently, is thus seen as representing a competitive edge in an increasingly globalizing job market.

Some practical activities through ICT

- **Problem - based learning**

Students work to solve challenging, real-world or life-like problems related to subject disciplines. Students leverage a range of traditional and digital tools to create and publish their work to state-wide audience using edTube and edStudio.

▪ **Games-based learning**
Students engage in play-based tasks or create their own games in order to develop knowledge and skills.

▪ **Peer tutoring**
Students use expert peer tutors to develop aspects of their digital literacy and scaffold their completion of digital assessment tasks.

▪ **Virtual role play**
Students take on the role of a character or prominent figure and interact with others in an iConnect web conference or create a mock online profile within an edStudio.

▪ **Dialogue**
After establishing working protocols, students participate in substantive conversations with peers using online discussion boards to develop and clarify understanding of concepts and receive constructive feedback.

▪ **Drill and practice**
Students develop understanding of essential knowledge through repetitive tasks supported by learning objects, online games or peer-created quizzes and interactive resources.

▪ **Group work**
Students work in small groups where individuals are responsible for part of the learning, leveraging online resources and learning scaffolds. Students are responsible for teaching others in the group core knowledge and skills.

▪ **Workshop**
Students work over an extended period developing key competencies and digital literacies through intensive teaching, modeling and scaffolding. Students receive immediate feedback to promote sequential mastery of learning.

▪ **Back channels**
While engaging with the teacher, peer or expert presentations or demonstrations, students contribute to a backchannel using the chat tool in Connect web conference to discuss relevant aspects, summarize key points or ask fellow audience members clarifying questions.

▪ **Virtual field experiences**
Students engage in virtual field trips through the Learning Place to participate in rich, real-world learning experiences.

▪ **Reverse instruction**
Students develop core knowledge and skills for homework through teacher and student-captured explicit instruction, shared through edTube at the Learning Place. In-class, students focus on higher order tasks, substantive conversations and monitoring assessment.

▪ **Online debate**
Students engage in robust conversations to argue opinions and make decisions using the learning place student space blog tools. Students use hash tags to easily sort and access peer blogs relevant to their discussion.

▪ **Explicit instruction**
Students engage with structured teacher modeling and delivery of core knowledge and skills enhanced by digital technology. Students are provided the opportunity to practice and consolidate new competencies in different contexts.

Barriers to integration of ICT into Teaching - Learning
The act of integrating of ICT into teaching-learning is a complex process and one that may encounter a number of difficulties. These difficulties are known as “barriers”. It can be classified into two levels, one is teacher-level barriers another school-level barrier.

Teacher-level barriers
- Lack of confidence among teachers during integration.
- Lack of access to resources.
- Lack of time for the integration.
- Lack of effective training.
- Facing technical problems while the software is in use.
- Lack of personal access during lesson preparation.
- The age of the teachers.

School-level barriers
- Schools are not interested in integrating ICT in the curriculum.
- Schools are unsure as to how effectively to integrate ICT in teaching.
- Teachers do not have sufficient time to integrate ICT.
- Lack of support from administration.
- Lack of ICT infrastructure.
- Lack of technical support regarding ICT integration.
- Lack of knowledge about ways to integrate ICT in lessons.
- Lack of training opportunities for ICT integration knowledge acquisition.

Advantages of ICT
Here are some of the benefits which ICT brings to education, according to recent research findings.

Advantages for Teachers
- ICT facilitates sharing of resources, expertise and advice.
- Greater flexibility in when and where tasks are carried out.
- Gains in ICT literacy skills, confidence and enthusiasm.
- Easier planning and preparation of lessons and designing materials.
- Access to up-to-date pupil and school data, anytime and anywhere.
- Students are generally more ‘on task’ and express more positive feelings when they use computers than when they are given other tasks to do.
- Computer use during lessons motivated students to continue using learning outside school hours.
- Higher quality lessons through greater collaboration between teachers in planning and preparing resources.
- More focused teaching, tailored to students’ strengths and weaknesses, through better analysis of attainment data.
- Gains in understanding and analytical skills, including improvements in reading Comprehension.
- Development of writing skills (including spelling, grammar, punctuation, editing and re- drafting), also fluency, originality and elaboration.
- Flexibility of ‘anytime, anywhere’ access.
- Encouragement of independent and active learning, and self-responsibility for learning.

- Students found learning in a technology-enhanced setting more stimulating and student- centered than in a traditional classroom.
- Broadband technology supports the reliable and uninterrupted downloading of web-hosted educational multimedia resources.

Advantages for Parents

- Easier communication with teachers.
- Higher quality student reports – more legible, more detailed, better presented.
- Increased involvement in education for parents and, in some cases, improved self-esteem.
- Increased knowledge of children's learning and capabilities, owing to increase in learning activity being situated in the home.
- Parents are more likely to be engaged in the school community.

Disadvantages of ICT

- Students could just copy information off the Internet and this means that they would not actually learn anything as they were just copying.
- Everyone needs to be trained to use ICT.
- ICT can be very expensive to start up.

Enhancing Teaching – Learning through ICT

For the development of teaching – learning process through ICT, the Government and concerning educational departments should take the following some enhancing programs, they are;

- Schools need to provide training courses for teachers to gain experience in dealing with the new devices, modern technologies and new pedagogical approaches.
- Basic computer skill should be taught to teachers and students.
- Provides Computer Lab, Digital libraries and wi-fi facilities at all educational institutes.
- Orientation programs on ICT may conduct at all educational institutes.
- Teachers should be given assignment, homework, project work and test through online to students.
- The Government should conduct the online -teaching and online – test at all educational institutes.

Provides the facilities of Tele- conference, Video-conference, Online - teaching, e-learning, e-teaching, e-library and e-book for teaching – learning process for teachers and students.

There are details of overcome the barriers and some implications for teachers and schools for successful integration of ICT into education arising are given from the exhibit. 2:

EXHIBIT: 2

Possible implication for schools and teachers for the integration of ICT into teaching-learning

Implementation		
Barriers	**For schools**	**For teachers**
Lack of access	- Providing ICT resource including hardware and software	- Taking advantage of resources offered at schools - Access to ICT resources at home
Resistance to change	- Training in new pedagogical approaches	- Being open minded towards new ways of teaching
Lack of time	- Providing sufficient time: reducing the number of teacher lessons or increasing the daily lesson time	- Acquiring skills of self- organisation and time managements
Lack of training	-Providing training courses in dealing with new devices, modern technologies, and new pedagogical approaches	- Preparing themselves(pre-service) by self-training -Taking up opportunities for training offered at schools - Knowing how to access to resources
Lack of technical support	- Providing continued technical support	- Relying on themselves to be able to solve problems in their use of ICT - Accessing available support

Conclusion

Students and teachers should address this change in our society as a chance to improve our educational practices in order to achieve an education with quality. As ICT are incorporated the trend of a classroom and textbook based educational system is becoming more and more outdated. It can clearly be seen that the education system should change to adapt to modern requirements and to incorporate new technologies. The major barriers were lack of confidence, lack of competence, and lack of access to resources to be critical components for technology

integration in schools, ICT resources including software and hardware, effective professional development, sufficient time, technical support need to be provided for teachers. However, the presence of all components increases the likelihood of excellent integration of ICT in teaching – learning opportunities. ICT can change the conventional classroom into smart classroom and also it helps to improve the quality education.

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