Journal of Advances and Scholarly Researches in Allied Education
Vol. 20, Issue No. 1, January-2023, ISSN 2230-7540

DOI: https://doi.org/10.29070/sr8v0530

The role of Information and Communication Technology (ICT) in Transforming Education: Trends, Applications, and Impacts

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Abstract: Information and Communication Technology (ICT) has become a cornerstone of modern education, significantly transforming teaching, learning, administration, and content delivery. This paper explores the evolution, integration, and impact of ICT across various levels of education, with special attention to its application in Indian institutions. It highlights the paradigm shift in pedagogy driven by ICT tools such as multimedia content, digital classrooms, online platforms, and e-learning modules. Government-led initiatives like SAKSHAT and RMSA demonstrate India's growing commitment to digital literacy and inclusive education. The paper also discusses the critical role of ICT in empowering educators, bridging the digital divide, enhancing evaluation practices, and increasing students' engagement and academic performance. Ultimately, ICT is not just a support mechanism but a driver of educational innovation and equity in the 21st century.

Keywords: ICT in education, digital learning, e-learning, teacher training, educational technology, ICT in India, classroom technology, online learning, student engagement, educational quality, digital literacy

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INTRODUCTION

Any number of devices and systems that can receive, process, and store data are together known as information and communication technology (ICT). Any medium that allows for the transmission of information or the use of computers falls under this category. This includes the internet, broadcasting equipment, and computers themselves. The use of digital, learner-centred models has replaced more conventional, chalk-and-talk techniques in the classroom as a result of advancements in information and communication technology (ICT).

Information and communication technology (ICT) in the classroom allows for more personalised instruction, better group work, and easier access to relevant resources. Digital education initiatives in India, such as SAKSHAT, Smart Class Initiatives, and ICT@Schools under RMSA, highlight the government's commitment to improving educational opportunities and standards. Internet of Things (IoT) technology is essential at all levels of education, from elementary to university, helping with the delivery of curricula, teacher professional development, student evaluations, and administrative effectiveness.

Technology in education (ICT) has the ability to bridge socioeconomic and geographical disparities in education, and this study explores how these tools have altered contemporary educational practices. In today's knowledge-driven culture, it also delves at how ICT might make learning more interesting, accessible, and efficient.

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

Figure 1: Information and Communication Technology

It is said that ICT is a "diverse collection of technologies, tools, and resources used to communicate, as well as to develop, disseminate, store, and manage information." Technology in the service of learning and individual development encompasses a wide range of electronic devices and the human-computer interfaces that go along with them. Devices that fall within this category include computers, telephones, and internet broadcasting systems. Information and communication technology (ICT) refers to any system that processes or shares data in order to meet human needs or achieve human objectives. In the field of education, "information and communication technology" refers to the infrastructure and tools that facilitate various forms of instruction and learning.

When these technologies are used in the realm of education, it is referred to as ICT in education. The phrase might also be used as a replacement for technology in the classroom since it includes both software and hardware solutions that could enhance educational results. Information and communication technology (ICT) encompasses the physical infrastructure, software, and data stored in computers; hence, it is critical to discuss the integration of technology into the classroom by centring on developments in computer-based technology. This is the era in which we find ourselves. We almost never go a day without using some kind of information and communication technology. Nothing is tolerated in our educational institutions or lecture halls. If you want to become an expert in these technologies and know how to use them in your classroom, this is the course for you.

In these systems, ICT (information and communication technology) is used. The three most popular forms of mass communication in the past were the radio, television, and print media. Because of the digital revolution, traditional systems have transformed. Analogue television has been superseded by digital television. Printed and digital editions of the newspaper are available to us. Along with traditional radio, we also offer an online radio. There has been a recent uptick in the use of several of these in educational settings.

EVOLUTION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN EDUCATION

Prioritising the use of ICT in education is more important than expanding educational technology. The discipline of educational technology has been renamed to information and communication technology (ICT) as ICTs now possess all of the benefits of education technology. Within this framework, ICT includes both traditional and cutting-edge forms of instructional technology. There are two ways to talk about the use of technology in the classroom. The first is an enormous change in our perspective on education and, by extension, the ways in which students learn. The second is to create innovative technology that can meet the needs of the first transition. We should examine each of them more closely.

INFORMATION AND COMMUNICATION TECHNOLOGY IN INDIAN EDUCATION

In light of the importance of ICTs, the Ministry of Human Resource Development has recognised their potential to increase college enrolment from 20% to 35% by the end of the eleventh Plan period, as stated in the Mission Report. One way to achieve this goal is by the integration of ICTs into the classroom.

Another tool used in organisational transformation is a website known as "SAKSHAT," an abbreviation for "One-Stop Education Portal." Once created, SAKSHAT will display ongoing progress in all subjects and classes. A number of projects that aim to transform education in India are now in the pilot phase. The "Developing appropriate pedagogical methods for different levels, intellectual calibres and research in e-learning" initiative is spearheaded by IIT Kharagpur. Teachers from every one of the IITs and even a few of the NITs are working together on this new course outline. The National Expedition on Teaching using Information and Communication Technology (ICTs) has funded the development of digital labs, web applications and standard applications, online meeting equipment, and talk to educator initiatives.

Figure 2: ICT in Indian Education

Information and communication technology (ICT) has been included into schools as part of the Rashtriya Madhyamik Shiksha Abhiyan (RMSA). Now the RMSA includes ICT in Schools. Secondary school students have had the chance to enhance their ICT skills and study via computer-assisted learning through the Information and Communication Technology (ICT) in Schools initiative, which was established in December 2004 and revised in 2010. To help students from all walks of life and all corners of the globe close the digital achievement gap, the Scheme is an important engine. In order to help state and municipal governments establish permanent computer labs, the Program offers financial assistance.

IMPORTANCE OF ICT IN LEARNING AND TEACHING EVALUATION

In the past few decades, ICTs have changed the educational environment by becoming the most effective teaching methodologies used by both teachers and students. ICTs have revolutionized education in the last few decades. Both students and teachers have discovered it to be beneficial. Finding material outside of courses is no longer a hurdle in terms of time and money. Several firms are guaranteeing that educational establishments have options, supporting the area's development of ICT learning.

Recognizing the value of digital literacy in rural India, Samsung India collaborated with Navodaya Vidyalaya Samiti to launch the Smart Class initiative in 2013. About 2.5 lakh students profit from the scheme, which is available in five hundred fifty Jawahar Navodaya Vidyalaya Schools. Over 8,000 teachers have received interactive learning training from the brand.

Figure 3: Importance of ICT in teaching and learning evaluation

DOES INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) HELP TO INCREASE EDUCATIONAL QUALITY?

That raises the fundamental question of whether ICT is even needed to improve educational quality. Generation X professors are adamant that chalk and talk is the best way to teach, and that showing content through PowerPoint or other means adds little value to the teaching-learning process. ICT, on the other hand, is commonly used as a valuable teaching method for delivering high-quality lectures in several ways around the world. For instance, in many cases, a realistic illustration combined with theoretical specifics makes it simple for students to grasp the subject.

There are several videos and animations on the internet that can be used to teach learning. Second, the lecture notes created in PowerPoint can be easily imported into the institutional learning management system (LMS) and accessed by students as required. Video recordings of laboratory procedures can be made and submitted to the institutional LMS. Those videos can be used by students to study for the exam. Sophisticated mechanisms, such as the Lecture Recording Device, can record the entire lecture, including PowerPoint videos and other objects, and upload it directly to the institutional LMS so that students can link to it later.

THE IMPORTANCE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN EDUCATION INSTITUTIONS

A more official variant of the phrase "information technology" is the acronym "ICT," which stands for "information and communication technology." According to ICT, we rely heavily on computers, the web, mobile devices, and other forms of electronic communication in our daily lives. Information and communication technologies have had an impact on almost every sector of society, including the commercial world, the military, and schools. One of the most common uses of ICTs is in the field of education.

It's no wonder that as the usage of the internet has grown in nations like India in recent years,. In general, instructors and learners use ICT effectively in their daily teaching and learning practices.

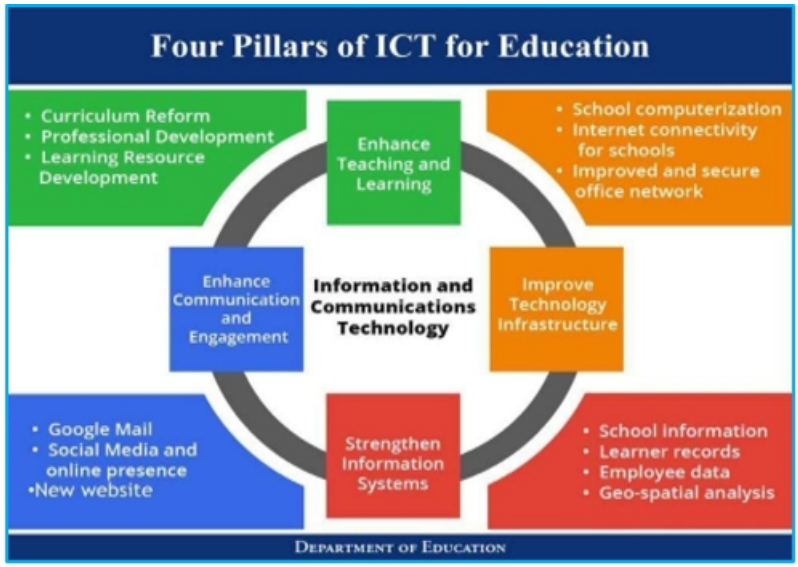

Figure 4: Importance of ICT

There are several ways in which "information and communication technology" (ICT) might be used in the classroom. This tool will be used by teachers to demonstrate, assess, and monitor their students' understanding. Teachers may streamline and improve school administration with the use of software like systems. At last, students may utilise ICT to study the subject and improve their reading and writing abilities simultaneously. Education as we know it has evolved in response to the rise of information and communication technologies (ICT). The evolution of instructional tools from traditional tools like chalk and blackboards to modern ones like computers and multimedia projectors is a direct result of the advancements in information and communication technologies. There has been a significant reduction in their workload as well. Teachers need extensive training and experience with ICT-assisted instruction to effectively use this technology in the classroom. Governments throughout the world are providing professional development opportunities for educators to increase their use of technology in the classroom. Information and communication technology facilitates group work and individual study.

With the use of ICT, students improve their reading skills, which in turn raises the bar for education. Technology has also played a significant role in the education sector, facilitating the simple and rapid transition from paper-based to computer-based administration of once labour-intensive processes. Practically every aspect of a school, including research, library work, and paperwork, has been mechanised with the use of school management systems and other information and communication technology

applications. With the use of ICT technologies, school management was able to decrease stresses and increase efficiency.

When it comes to the learning processes of pupils, ICT is beneficial. It provides cognitive scaffolding to help students digest information more efficiently, which in turn helps them develop higher-order thinking abilities. Modern students are more likely to seek solutions online rather than in class, which encourages them to be independent thinkers who can successfully finish their homework without instructor intervention. Nowadays, they have an easier time finding job because to their proficiency in ICT. A brighter future awaits all nations because "information and communication technology" has raised the standard of student work.

ICT IN THE CLASSROOM

One of the most impacted areas by technological progress is education. Online information service delivery, learning event coordination, and assessment management are just a few areas that have been profoundly affected by developments in information and communication technology. Everyone involved in education—students, instructors, and administrators—has profited from the use of ICT. These subjects will be covered more thoroughly in the remaining Units of this course.

The definition map below shows how ICTs can be used in several instructional activities, such as teaching and learning, evaluation, organization, and training and development for educators. It can be used in content development, delivery, and collaboration in the teaching and learning dimension of education, for example. Let's take a closer look at one of them, content creation, for example. Many resources, including hardware and material, are available via ICT. The hardware category includes both computing and display units. Open Education Resources (OER) and Reusable Learning Objects (RLOs) can be used as content sources (RLO). Other facets of educational practice could benefit from a similar in-depth investigation of ICT use. Another example is teacher professional growth. Webinars, online classes, online community projects, online tutorials, social networking, and other ICT resources offer a range of opportunities. Examine the other elements in the diagram to see how ICTs relate to educational practice. The rest of this course's Units will go over these topics in greater depth.

ICTS IN PRIMARY, SECONDARY, AND HIGHER EDUCATION

Regardless of technology requirements, distance education enrolls a significant number of students, where students have such a fundamental mastery of primary skills and have developed the ability to learn online. In placed importance like engineering and science, where professors are in high demand on global, national, and regional levels, distance learning programs are widespread. However, as evidenced by the increased competition for MOOCs, the overwhelming investment in online education has happened at the universities. Distance education programs will develop a variety of active learning approaches and support e-learning as a result of the need for a huge, cost-effective improvement of new options in elementary and secondary school. New technologies, such as education tablets, have made it possible for students, including those who are illiterate, to engage in this online course.

Whereas some NGOs have attempted this strategy by providing children with hand- held learning equipment, research has shown that ICT-assisted education is most effective both in middle and high

schools levels when teachers are empowered to break free from the constraints of the typical classroom. on the other hand, in countries like the Philippines and Sudan, the need for education for underprivileged children will stimulate the growth of educational methodologies, which will gradually replace conventional teaching methods.

Whereas some NGOs have attempted this strategy by providing children with hand- held learning equipment, research has shown that ICT-assisted education is most effective at both the middle and high levels when teachers are empowered to overcome the traditional classroom model. However, in countries such as the Philippines and Sudan, the need for education for underprivileged children will spur the growth of educational methodologies, which will eventually replace conventional teaching methods. The importance of education for children from low-income families in countries such as the Philippines and Sudan, on the other hand, would spur the growth of educational methodologies, which will eventually replace conventional training methods.

As a consequence, I'm confident that the UN Commission on Science Tech., and Development would look towards the use of ICTs in academic activities, thereby addressing the challenges that developed nations have in primary, secondary, and higher education.

TEACHER AND ICT

Information and communication technology (ICT) encompasses research in the STEM disciplines as well as management practices for storing, retrieving, analysing, and making sense of data in relation to societal, economic, and historical issues (UNESCO, 2002). There is extensive usage of ICT in educational institutions as well. Everyone involved in or interested in education uses some kind of information and communication technology. Teachers utilise ICTs to enhance and captivate their students' learning and teaching experiences.

In order to effectively teach their students, professional educators use a wide range of skills and tactics. Consequently, the development and enhancement of teachers' capacities need an understanding of ICT as well as Science and Technology. Educators in today's scientific and technical contexts need to be well-versed in ICT and able to effectively use it in the classroom. In order to fully grasp the world of technology and its potential future applications for the benefit of students, it is essential for pre-service educators to have a firm grasp of information and communication technology (ICT) during their training sessions. By facilitating tools to enhance instruction, providing instructors and students with additional services and resources for assessment, and bringing new curriculum centred on real-world issues and activities, ICTs are already providing a fresh start to education systems. The interaction between educators, students, and parents is also made easier by ICT. Uninterrupted excellence In order to ensure that education is accessible to all students, including those in the future, evaluations should push for more use of technology in the classroom. In order to better aid their students in learning, instructors should be well-versed in the use of ICT in their particular fields of study.

Therefore, it is essential that educators, both in training and already working in the field, possess a thorough comprehension of ICT. Teachers should find this useful in understanding how to integrate technology into their lessons. This takes a look at how information and communication technologies have affected modern-day teacher preparation and practice.

Traditional classroom instruction is giving way to more interactive, two-way dialogue. Both instructors and students are becoming more involved in classroom discussions. These days, the emphasis in training is on the boy. Therefore, it is imperative that educators be well-versed in a variety of technological tools so that they may effectively incorporate them into the classroom and enhance the learning experience for their students. An excellent tool for incorporating technology into such learner-centric approaches is project-based learning, which positions students as active researchers in the classroom. Technology has facilitated quicker and more precise communication while also enhancing the relevance and accuracy of ideas. It is a crucial means of data collection; thus, students are inspired to gather information from many sources, and their education has improved compared to before. Hence, information and communication technology play an essential role in both the preparation and practice of teachers.

With the use of ICT, educators may not only learn about new digital learning tools, but also stay abreast of new knowledge and skills. Educators might enhance their teaching abilities by using and comprehending ICT. Information and communication technology (ICT) is a major force behind the rapid societal transformation that we are seeing today. It has the potential to alter the educational system and the roles of both students and teachers in the classroom. The use of technology in the classroom has just started in India. Digital classrooms, storage devices, EDUCOM, desktop computers, LCD projectors, and laptops are becoming more and more ubiquitous at teacher training institutions.

Since teachers are the only ones who can guarantee a prosperous future for their students, it is imperative that we embrace ICT in the classroom in the 21st century.

THE CHANGING EDUCATIONAL SCENARIO

In a rapidly changing information and knowledge environment, employability is the current need of any student completing Higher Education. It also involves other skillsets beyond the possession of basic skills listed by employers (Bridgstock & Ruth 2009). This has brought a lot of change in the mode of knowledge delivery and the skillsets developed through it.

Today, the knowledge of ICT and networking is becoming the most important requirement for every profession. The role of ICT is increasing day by day (Toro & Joshi 2010). Employers look for candidates with knowledge of ICT tools and their practical usage to work effectively in the real world. In a technology driven society knowledge rewrites the fate of a nation and so does higher education (Dash 2011).

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