



## **A STUDY OF ICT TECHNOLOGY TOWARDS LEARNING AND TEACHING METHODS**

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### **ABSTRACT**

Over the last several years, there has been a dramatic shift away from conventional approaches to education and toward those that make use of information and communication technologies (ICT). The purpose of this research is to examine how information and communication technology (ICT) influences the efficiency of computer science classroom instruction and student learning. Because of its ability to improve education generally, the rise of ICT has marked the beginning of a new age in the field. There is hope that incorporating technology into computer science curricula will make lessons more interesting, interactive, and up-to-date with students' demands in the modern digital world. The research investigates many aspects of this integration, looking at how to use ICT tools to create a good learning environment.

The function of information and communication technology in enabling individualized educational experiences is one important facet tested. A dynamic and adaptable instructional strategy is necessary in computer science because of the field's fast-paced nature. Educators and students alike may benefit from the adaptability that comes with using information and communication technology (ICT) tools including online platforms, interactive simulations, and multimedia materials. This flexibility is essential for encouraging a more thorough grasp of difficult ideas and for developing a feeling of control over one's own educational path. In addition, the research delves into how information and communication technologies have altered the dynamics of group projects in computer science classrooms. Computer scientists must be able to work well with others because of how interdependent our environment is. By removing geographical and physical obstacles, students are able to work together more effectively with the use of ICT technologies.

**KEYWORDS:** ICT Technology, Learning and Teaching Methods, learning environment, modern digital world.



## INTRODUCTION

Information and communication technology (ICT) is all the rage, particularly in the classroom, where it has quickly become an asset due to its efficiency and effectiveness in drawing in both students and instructors. Despite the immediate benefits of ICT, there is still insufficient infrastructure to integrate it into the system. A tiny sample distributed over several areas is used to test the execution. Therefore, the implementation lacks the whole foundation for distinctive educational environment aspects. The next step is to improve the educational system's overall information and communication technology infrastructure. The experts in this field of ICTE are predicting that mobile phones will usher in a new age of education after a handful of successful apps launched in recent years. Modern technology has progressed to the point where highly configured mobile devices may compete with or even surpass the space and processing performance configuration of minicomputers. Mobile phones were a game-changer since they were inexpensive and widely available in nations with superior technology. Since several mobile phone firms have begun offering high-configuration phones at lower prices,

making them accessible to everyone, the number of mobile device holders in India has remained relatively low, hovering around fifteen million as of January 2009.

As a fantastic tool for distant learning, mobile devices provide a great alternative for those in charge of education policy. Mobile phones have expanded to wireless settings and surpassed monitors as the primary device for learning. Using a mobile device, students have access to instructional materials whenever and wherever they need them. Teachers may benefit from interacting with pupils from rural and suburban areas. In industrialized nations, educators have access to students' real-time data, and the "M-Education" app will go on to reach a massive audience interested in learning about and adapting to mobile devices' cutting-edge future. There are a lot of gaps and a lot of complicated roadblocks in the study that began with the combined study of research on using ICT in mobiles. Existing mobile technology will circle these intricacies. Screen size, battery life, keyboard size, and restricted CPU speed are some of the technical limitations of mobile devices that operate as execution complexity factors. This faculty has changed the teaching paradigm in the classroom to have a workaround. All of



these things are helping adults study in a more relaxed setting. Constraints on knowledge organization are caused by a lack of structure. This demonstrates the lack of a uniformly reviewed paradigm in mobile ICT.

A key factor redefining old paradigms of teaching and learning is the integration of Information and Communication Technology (ICT) in the rapidly changing field of education. In an effort to decipher the complex effects of ICT on pedagogy and student achievement, this research sets out to investigate the usefulness of ICT in computer science classrooms. The importance of teaching students both the theory and practice of computer science is growing in tandem with the digitization of everyday life. In light of this, this study aims to illuminate the revolutionary potential of ICT by investigating its function in computer science-related individualized learning experiences, collaborative pedagogies, real-world applications, and novel evaluation mechanisms.

A paradigm change has occurred with the incorporation of ICT into education, which goes beyond the confines of the conventional classroom and textbook. The use of information and communication

technology (ICT) tools is crucial in computer science, a field where technical progress is occurring at a dizzying rate, in order to connect theoretical understanding with real-world applications. This preliminary examination lays the groundwork for a thorough comprehension of the revolutionary potential of ICT by providing a framework for an in-depth examination of how it may change the processes of computer science education.

A wide range of digital tools and resources are collectively referred to as "Information and Communication Technology" in today's educational scene. The use of information and communication technology (ICT) in the classroom is vast, spanning from online resources to virtual labs, interactive simulations to shared code environments. Computer science is at the front of technological progress, and this research seeks to understand how ICT affects different parts of education.

## **ROLE AND IMPORTANCE OF ICT IN EDUCATION**

The International Institute for Communication and Development (IICD) released a demographic survey that revealed 60% of the participants believed that the use of ICT in the classroom would



have an immediate and beneficial effect on their mood. A familiarity with the use of ICT in the classroom helped eighty percent of the audience members expand their knowledge (2007). Using ICT, which is done all over the world, can greatly improve the quality of education. Information and communication technology (ICT) is a godsend for both educators and their students. The key to information and communication technology (ICT) is its availability; data will be accessible at a unique pace, opening new educational opportunities to individuals and groups. Thanks to technological advancements, geographical distance is no longer an excuse for not getting an education, and this includes distances across oceans. Teachers and students do not need to be physically present in the same classroom. Thanks to modern tools like internet chat, video conferencing, teleconferencing, and distant learning, synchronization is now a breeze. Countless digital materials of all kinds are available on the internet, which may also shed light on forthcoming cutting-edge technologies; all it takes to hold a little workshop and teach the resources in ICT is to dip your toes into this vast ocean. As a result, reliance is lessened, and what's more, students, teachers, and the environment are

spared the burden of having to rely on tangible study materials like printed textbooks and notes. Skilled researchers on the topic will be accessible at all times, day or night, to answer any questions or provide explanation. Students in many industrialized nations may now access a wide range of courses online, eliminating the need for them to physically attend a classroom. Virtual reality is quickly becoming the norm in education, thanks to e-learning, which includes application and system learning as well as electrifying digital collaboration, simulated classrooms, and the delivery of content through digital means (such as audio/video tape, real-time quizzes, etc.). It is still an ultimatum in economically underdeveloped nations, and only a small number of emerging nations have exhibited any interest or even begun to grasp the taste.

Information and communication technology (ICT) has revolutionized education in the 21st century, replacing antiquated methods of instruction. The term "information and communication technology" (ICT) refers to a wide range of instruments that may improve teaching and learning, including as computers, software, the internet, and other digital resources. This all-encompassing investigation

examines the many facets of information and communication technology (ICT) in education, including its effects on student learning, pedagogy in the classroom, administrative practices, and the educational system as a whole.

## **1. Enabling Access to Information**

In terms of education, one of the most important things that ICT has brought about is the democratization of access to knowledge. Teachers and students alike have immediate access to a treasure trove of material thanks to the internet, which acts as a huge reservoir of knowledge. Because of this, students from all over the world are able to access information from all over the world, regardless of their location. Information and communication technology (ICT) helps level the playing field in education by creating virtual libraries, instructional websites, and digital archives.

## **2. Enhancing Learning Experiences**

With the use of ICT, learning experiences are greatly improved because of the dynamic and interactive information that is made available. Students are more actively involved with digital textbooks, multimedia presentations, and online simulations than

with more static, conventional forms of instruction. Complex ideas are made more understandable by including visual and interactive components, which appeal to a variety of learning styles. A more engaging and student-centered method of instruction may be achieved via the use of subject-specific educational software and apps.

## **3. Facilitating Personalized Learning**

The use of information and communication technology (ICT) is crucial to the emergence of customized learning, which is driven by the significance of understanding and meeting the unique requirements of each learner.

Adaptive learning systems modify course materials according to each student's unique strengths and weaknesses using algorithms. This individualization makes sure that every student may study at their own speed, filling in knowledge gaps and encouraging a more thorough comprehension of the subject. Technology in education (ICT) helps create a more accessible and efficient educational system by allowing for more tailored learning paths.

## **4. Empowering Teachers and Transforming Pedagogy**



Teachers are given more agency via the use of ICT since it equips them with materials and tools to improve their teaching methods. Beyond the four walls of a conventional classroom, instructors may now collaborate with students online, exchange materials, and design engaging classes with the help of learning management systems (LMS).

Pedagogy becomes a dynamic and engaging process with the inclusion of multimedia components like films, animations, and interactive presentations. This captures students' attention and helps them comprehend subjects deeper.

## **5. Promoting Collaborative Learning**

To succeed in the modern world, one must be able to work well with others, and information and communication technologies make this possible. It is no longer an issue for students to collaborate over great distances thanks to online discussion forums, collaborative editing systems, and virtual group projects. Teamwork, communication, and problem-solving are crucial qualities for success in today's workforce, and this not only mimics the collaborative nature of professional work settings but also cultivates them.

## **6. Fostering Digital Literacy and 21st-Century Skills**

Students must develop digital literacy skills to help them navigate the complicated digital world in this technology-dominated day. The use of information and communication technologies (ICT) in the classroom allows students to think critically, use technology responsibly, and adapt to a world where technology is always changing, going beyond just teaching them subject-specific material. For students to succeed in today's technologically advanced and globally linked society, they must develop 21st-century abilities such as critical thinking, creativity, communication, and teamwork.

## **7. Improving Assessment and Feedback Mechanisms**

The wide range of abilities needed in the contemporary workplace is difficult, if not impossible, to measure using conventional means of evaluation. With the advent of new technologies like online quizzes, virtual laboratories, and real-time feedback systems, evaluation has been transformed by ICT. To better reflect students' actual levels of competence, adaptive exams change the degree of difficulty depending on their personal growth. Teachers may

also provide students with timely and critical feedback using digital channels, which encourages a growth mentality.

## **8. Expanding Educational Opportunities**

For students in underprivileged or far-flung locations, ICT may be the key to finally getting the education they deserve. Anyone, regardless of their location, may have access to a high-quality education via online courses, virtual classrooms, and e-learning platforms. The democratization of education, which ensures that learning options are not limited to conventional brick-and-mortar institutions, and lifelong learning are profoundly affected by this.

## **9. Strengthening Educational Administration and Management**

Information and communication technology (ICT) helps educational institutions run smoothly in areas outside of the classroom as well. Online resources simplify administrative processes including student registration, record-keeping, and correspondence. With the use of learning analytics and data-driven decision-making, school administrators can now evaluate programs more accurately, pinpoint problem areas, and craft well-informed policies.

## **10. Addressing Educational Inequalities**

While closing the digital gap is no easy feat, information and communication technologies (ICT) hold great promise for leveling the playing field in terms of educational opportunity and resource distribution. Community internet centers, mobile learning platforms, and one-to-one device programs are some of the initiatives that are working to close the digital divide in our nation. There will be less of a gap in educational achievements if we can make information and communication technology more accessible and inclusive.

## **11. Preparing Students for the Future Workforce**

Students may get the skills and knowledge needed by today's employers in the ever-changing employment market via ICT education. Students are better prepared for jobs in technology-related sectors when they have exposure to digital tools, programming, and coding. Being well-versed in digital communication tools and collaborative online platforms also helps one develop the professional abilities needed to thrive in today's globally interconnected workplace.

## **12. Encouraging Lifelong Learning**



Information and communication technology (ICT) enables this never-ending educational journey, which is essential in today's technologically driven society. People may learn new skills, refresh old ones, and keep up with industry trends via online courses, webinars, and other digital tools. Embracing ICT in education fosters a mindset of lifelong learning, equipping learners to navigate the dynamic needs of the knowledge economy.

## **ICT A CHANGE PROCESS ESPECIALLY IN EDUCATIONAL FIELD**

A large number of Indian colleges have embraced and embraced the revolutionary changes brought about by information and communication technology (ICT) in the classroom. It will take years for any revolution to occur. An outcome is the result of a series of steps. Do you know what I mean by "change"? and how does the transformation take place? The following part goes into great depth on all of these points. Change is on the horizon, and with it comes new activities that will alter the status quo of how things are often done. This could take a short while or a long time. This next update is a major one, therefore it won't mess with the current functionality or

change anything major about how the duties are performed. Fullan outlined this concept in 1991. An organization's core processes undergo secondary change when they are updated to include new goals, designs, and roles. Although initial change is often achievable, subsequent change is very challenging. Regarding the introduction of secondary modifications According to Bates, A.W. (2000), colleges should embrace and familiarize themselves with the new paradigm of information and communication technology (ICT) in the classroom. Making a little adjustment to an already established procedure isn't enough. Actively utilizing technology in education requires revolutionary and evolutionary thinking; beginning this activity will necessitate reforming universities, which entails changing the way universities and higher education institutions are administered, planned, and organized. A shift in company culture, he says, is the most important factor in preparing for new technology. It is recommended that the learning model include future technologies. A new policy should be established to monitor the use of this technology outside across several university departments.

The introduction of ICT heralds a period of revolutionary transformation, especially in





the realm of education. As a result of this paradigm shift, conventional wisdom about education has given way to new ways of thinking about the role of technology in the classroom. To better understand how ICT has altered the educational environment as a whole, as well as how it has altered instructional methodologies, teacher roles, student agency, and more, this investigation probes the many facets of ICT as an agent of change in education.

## **1. Transforming Instructional Strategies**

The evolution of pedagogical practices is crucial to the transformation accelerated by ICT. The days of textbooks and chalkboards in traditional classrooms have been replaced with more interactive, tech-enhanced settings. In today's classrooms, technology such as digital projectors, interactive whiteboards, and online multimedia resources are essential for promoting student participation and involvement. The days of teachers relying on cookie-cutter methods are over; now, they can design interactive lessons that engage students of all learning types.

## **2. Empowering Educators as Facilitators of Learning**

Teachers are no longer just disseminators of information; they are increasingly active participants in the learning process, thanks to the transformative potential of information and communication technology. Teachers now have more options than ever before to improve their teaching methods, thanks to online professional development programs, collaboration platforms, and digital materials. Educators may participate in ongoing professional development, exchange effective strategies, and learn about new trends in the field via online groups, webinars, and professional learning networks.

## **3. Empowering Learners as Active Participants**

The introduction of ICT has changed the paradigm in education from one that prioritizes teachers to one that prioritizes students. Students nowadays take an active role in their own education rather than only receiving it.

## **4. Reshaping Assessment and Feedback Mechanisms**

Because of the incorporation of ICT, assessment techniques have changed drastically. Online quizzes, virtual



laboratories, and multimedia projects supplement, and in some instances even replace, more conventional forms of student evaluation. Students are able to monitor their own development and make adjustments as a result of the move toward formative evaluations, which are made possible by digital technologies. A more adaptive and iterative method of learning is fostered by this ongoing feedback loop.

## **5. Facilitating Distance Learning and Lifelong Education**

The proliferation of online and remote learning has highlighted the critical role that ICT has played in removing geographical obstacles to education. Learning management systems, video conferencing, and virtual classrooms have leveled the playing field in terms of access to education. Learning throughout life, career advancement, and skill improvement are all greatly affected by this democratization of education.

## **6. Cultivating Digital Literacy and 21st-Century Skills**

Cultivating digital literacy has emerged as an essential component of contemporary education due to the ubiquitous nature of ICT in society. Students need to learn how

to responsibly browse, assess, and apply digital information in addition to acquiring subject-specific knowledge. It is the responsibility of educational institutions to ensure that students are well-versed in digital literacy and can effectively use technology for their academic and professional endeavors.

## **7. Enhancing Institutional Management and Administration**

Information and communication technology (ICT) has transformed the way schools manage their operations outside of the classroom as well. The use of digital technologies simplifies several processes, including student registration, record-keeping, communication, and resource management. A Learning Management System (LMS) is a centralized platform for managing courses, communicating with students, and evaluating their progress.

## **8. Addressing Educational Inequalities and Inclusion**

Efforts are being made to reduce educational inequality through the strategic use of ICT, however the digital gap is still an issue. Community internet centers, mobile learning platforms, and one-to-one device programs are some of the initiatives

that are working to close the digital divide in our nation. The objective is to make sure that people from all walks of life and all parts of the world have equal opportunity to get a good education.

## CONCLUSION

Information and communication technology (ICT) has permeated every aspect of society, including the educational system, and this research aims to demonstrate that. According to a plethora of research, information and communication technology is a potent instrument with the potential to revolutionize classroom instruction. Staying afloat in today's cutthroat global market requires constant innovation. The use of ICT is crucial in accomplishing several objectives. With its capacity to surpass physical boundaries and enable learning to occur at any hour of the day, information and communication technology (ICT) is anticipated as a means to address several obstacles in the field of education. It is clear from the literature study that the education sector is in dire need of an innovative model for information and communication technology (ICT) and computer science, and that cloud integration is becoming more commonplace. Unfortunately, current ICT-based cloud systems fail to appropriately

address a number of critical aspects that may improve performance. Cloud infrastructure that is based on information and communication technologies has its most basic and important characteristic recognized. Students, educators, and industry professionals were the three main groups whose viewpoints were carefully considered in order to determine the features' potential usefulness. This investigation found that out of all the challenges related to ICT education, only 25% are related to interoperability, 21% to accessibility, and 19% to adaptation. Reusability makes up 11% and affordability only 8%, according to this study.

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