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# DIGITAL EMPOWERMENT IN EDUCATION: EXPLORING THE DYNAMICS AND SIGNIFICANCE OF ICT – A REVIEW

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## ABSTRACT

In the wake of the unprecedented global transformations triggered by the pandemic, various sectors underwent profound changes, with Education being notably affected. This prompted the exploration of novel approaches and refined methodologies to sustain continuous learning without encountering disruptions. Information and Communication Technologies (ICTs) emerged as pivotal change agents in the realm of education. Teaching, acknowledged as a profession that shapes individuals' character and destinies, faced challenges in adapting to digital platforms. This study delves into the digital literacy of educators, the hurdles encountered in embracing ICT, and the application of ICT in diverse teaching scenarios. Data for this research were gathered from faculty members across different undergraduate colleges in Bangalore city. ICTs have evolved into potent tools for fostering effective teaching and learning experiences. Notably, the assimilation of ICTs has heightened educators' confidence, transforming lessons into more engaging and interactive experiences for students. Observations suggest that the prudent use of ICT can serve as a catalyst, revolutionizing traditional teaching methods and ushering in an era of blended learning. The inclusion of diverse resources and technologies represents a significant development, benefiting both students and faculty members and ultimately ensuring the delivery of quality education.

***Keywords: - ICT, Teaching – Learning, digital technologies, Higher education, Technology, online learning***

## 1. Introduction

In an era defined by unprecedented technological advancements, the landscape of education has undergone a profound metamorphosis, propelled by the integration of Information and Communication Technology (ICT). The symbiotic relationship between education and technology has engendered a pedagogical revolution, reshaped traditional teaching methodologies and fostered an environment of dynamic and interactive learning. This research endeavors to delve into the intricate nuances of this transformative journey, specifically examining the role and impact of ICT in the teaching process from the perspective of educators. ICT, an acronym, denotes the integration of 'Information Processing, Computing and Communication Technologies' in a continuum and a range of different, albeit, rapidly converging technologies that fall into the union of IT and Telecommunications(Oliver, 2002). The word 'ICT' refers to the processing and preservation of data, as well as the use of all types of computers, communication, network, and mobile technologies for the transmission, processing, storing, producing, displaying, sharing, and exchanging of data via electronic means. The dissemination of shared knowledge has been significantly propelled by the emergence of information technology, acting as a pivotal force driving educational reforms. The integration of innovative technology-assisted learning tools, including mobile devices, smartboards, MOOCs (Massive Open Online Courses), tablets, laptops, simulations, dynamic visualizations, and virtual laboratories, has brought about transformative changes in the educational landscape of schools and institutions. Among these advancements, the Internet of Things (IoT) stands out as a particularly cost-effective method for educating young minds, providing a robust mechanism to integrate a world-class learning experience accessible to everyone(Dreimane & Upenieks, 2021).

ICT has become integral across various sectors, with its most prominent impact seen in the field of Education, where it serves as a catalyst for transformative changes in the teaching-learning process. The swift improvement in the use of ICT within the education sector, particularly in response to the challenges posed by the COVID-19 pandemic, underscores its essential role and broad applicability in education. The incorporation of ICT has effectively balanced knowledge dissemination, content creation, and information sharing among diverse stakeholders in the education sector.

ICT-enabled education is poised to bridge the gap between traditional and blended learning environments, incorporating digital technology into the educational landscape(Sarkar, 2018). The integration of ICT into the teaching-learning process is expected to enhance students' knowledge acquisition, problem-solving skills, data processing abilities, and communication skills. The outbreak of the pandemic in 2019

compelled educational institutions to transition to online learning, presenting a challenging phase for those less familiar with advanced technology(Dhawan, 2020).The increased adoption of ICT in the education sector during the pandemic has led to a significant rise in online pedagogy implementation across various institutions. Conventional classroom instruction falls short in creating an immediate learning environment, ensuring faster evaluations, and fostering increased engagement. In contrast, digital learning tools and technology address these shortcomings. The efficiencies offered by such technologies often surpass those of traditional learning methods(Dreimane & Upenieks, 2021). The widespread popularity of smartphones and other wireless devices among the general public underscores the logical step for schools and educational institutions to harness their potential within the classroom setting. The adaptability and non-intrusive nature of today's technology make learning more appealing to the next generation(Vakaliuk et al., 2021). However, incorporating these technological advancements into education may pose a challenge initially, as traditional instructors may be hesitant to embrace contemporary technology and gadgets in schools, perceiving them as potential distractions rather than intelligent learning aids(Cavas et al., 2009).

## 2. REVIEW OF LITERATURE

The 21st century have seen a drastic change with respect to the digital technology and these rapid developments have been providing numerous benefits for exchange of information and for the communication purposes. These changes have created a new environment and new opportunities for people to use their skills. With the increase in services there the young generation or Gen Z students are growing in a world where the technology has is present in everyday scenarios. Therefore, it is responsibility of the educators to bring a change in their teaching pedagogy and lesson plans and create contents which would enhance their students' skills and knowledge. Having the basic literacy skills is not enough in this current era where the educators should be having the skills to know how to access, create contents, store and make use of the available information and disseminate it to the students (Nagadeepa & Mohan, 2019).

(Nungu et al., 2023) study explored the impact of online collaboration on the learning, focusing on postgraduate students at the African Centre of Excellence for Innovative Teaching Learning Mathematics and Science. Data from 88 students were collected through online oral interviews and Likert scale questionnaires. The findings reveal that online collaborative learning, particularly through small group discussions, promotes knowledge co-construction and higher-order thinking skills in STEM subjects. The

use of electronic multimedia tools such as PhET simulations, animations, and YouTube videos is shown to enhance student retention and engagement.

(Narh et al., 2019) stated that stated that students face challenges while using different virtual platforms for the purpose of e-learning. The three challenges which were identified from the study was institutional, student- technological and environmental challenge. The respondents in the study had taken two platforms i.e. Open edX and Latitude Learning systems for the analysing the various factors involved for e-learning. One of the main concerns for negative impact for e-learning is the poor network connectivity and this is one of the reasons many institutions in Ghana has not taken up adopting e-learning as a way of learning. The success of e-learning in various institutions in Ghana solely depends on the provision of a well-structured and effective orientation program.(Kaur & Singh, 2018) The study has been conducted on secondary school teachers' attitude and beliefs in implementation of ICT tools in the classroom. There has been no significant difference in the gender while using ICT tools and it was found that usage of ICT while teaching is insufficient and inadequate. One of the main issues faced by teachers in India were poor infrastructure, lack of technical support and content related training. Since teachers' attitude and expectations are crucial to the effectiveness of implementing an innovation, it is necessary to determine how teachers view this innovation and its effectiveness as a resource for successful teaching and learning. (Ghavifekr et al., 2016) It was found that there is a high-level impact of challenges using ICT tools while teaching in the classroom. There are certain barriers which are extrinsic in nature which includes lack of resources, time, access and technical support. The teachers have used ICT tools to demonstrate and present the content and kept track of student's progress. In order to enhance learning outcome of student the barriers need to be addressed by the policy makers and management (Ghavifekr et al., 2016). Many authors have made an attempt to study the effect of certain attributes of the teachers of the implementation of ICT. There are certain personal traits such as gender, age, educational qualifications and teaching experience of the teachers which has a huge impact on the role of ICT integration in the classrooms (Basargekar & Singhavi, 2017). Gilakjani (2013) mentioned that computer self-efficacy or teachers' judgment related to their own proficiency in computers plays an important role in their using ICT in the classroom. Digital learning offers a myriad of benefits, ranging from minimizing the environmental impact associated with reduced paper usage for handouts and books to saving time and providing convenience for research. This approach proves to be a wonderful means of cutting costs, optimizing resources, fostering sustainability, and expanding the reach and impact for both students and teachers(Coffey et al., 2003). In the fabric of modern life and society, technology is pervasive and deeply intertwined. The ongoing digital revolution is permeating various facets of our world, and education is no

exception(Beardsley et al., 2021). This transformation is rapidly reshaping the learning landscape for students, with technology expected to enhance education by rendering it more affordable and accessible(Yordanova, 2007). This paper provides a concise overview of the applications of digital technologies in education. The two sections delve into the imperative need for digital technologies in education, offering insights into digital classrooms and the diverse applications of these technologies. Following this, there is a section addressing the challenges associated with digital technologies in education, accompanied by a discussion on the prospective future of digital technologies in shaping the educational landscape.

## 3. OBJECTIVES

- To study the need for digital technologies in education
- To examine the importance of use of ICT in education and identify the role of digital technologies applications in education
- To identify the significant challenges of digital technologies in education.

## 4. NEED FOR DIGITAL TECHNOLOGIES IN EDUCATION

The globalization of education has already mandated the incorporation of digital technologies. Online platforms were in existence for conducting classes, sharing resources, conducting assessments, and managing the day-to-day activities of academic institutions. However, the utilization of these platforms was predominantly proactive. The COVID-19 pandemic has compelled educational institutes to embrace online teaching methods as a means to sustain the education system(Carvalho et al., 2020). While developed countries were well-prepared to navigate this crisis, developing countries exerted significant effort to meet this requirement. In this critical time, digital technologies have emerged as the savior of education(Javaid et al., 2020). This global crisis underscores the imperative of international integration into the education system. Digital technologies play a crucial role in developing skills necessary for students' professional performance, such as problem-solving, creating structured thinking, and comprehending processes(Seale et al., 2021).

Educational resources and digital tools help to improve the classroom atmosphere and make the teaching-learning process more compelling(Shava, 2022). Furthermore, they give each educational institution greater flexibility and customisation of curriculum based on the requirements of each student(Ed, n.d.; Khyat et al., 2020). Employing computers and other devices in conjunction with digital tools empowers

students to take on a more proactive role, positioning themselves at the center of the learning process. In this paradigm, the instructor transitions into a guide, overseeing and approving learning efficiency. Leveraging a multitude of digital resources, learners can download necessary information or contribute their own content(Kumar et al., 2022). Web 2.0 technologies, including wikis, podcasts, blogs, etc., enable learners to generate content collaboratively, assess each other's work, and engage in co-learning. Digital technologies also facilitate the implementation of innovative classroom tactics such as gamification and instructional approaches like flipped classrooms, optimizing the learning experience(Osadchyi et al., 2021). Learning landscapes have evolved into didactic tools that blend various techniques, allowing for unique learning paths to be presented to each student. Technology enhances instruction, making it more inspiring and meaningful for the learners(Borthwick et al., 2015).

## 5. THE IMPORTANCE OF DIGITAL CLASSROOM AND USE OF ICT IN EDUCATION

The advent of digital technology has brought about a seismic shift in the landscape of education, ushering in an era where traditional classrooms are evolving into dynamic digital learning environments. Digital classrooms are characterized by the utilization of electronic devices or platforms, including social media, multimedia, and mobile phones, to deliver educational content to students(Roschelle et al., 2005). The integration of digital technology in education has brought about significant improvements in today's educational landscape. Digital learning, as a strategic approach, harnesses technology to encompass the entire curriculum, facilitating quick and efficient learning for students(Pacheco et al., 2018). Educational applications and websites play a crucial role in digital classrooms, enhancing students' learning experiences. Two essential components of a digital classroom are feedback loops and technology(Collis, 2002). Feedback loops provide students with real-time feedback from their teachers, allowing for personalized guidance based on various factors such as individual progress, lesson comprehension, group dynamics, and more. The teaching-learning process increasingly incorporates digital approaches such as PowerPoint presentations (PPTs), video presentations, e-learning methods, and online training, making classroom instruction more participatory(Lacka et al., 2021).This shift towards digital classrooms enables students to explore various topics independently, leveraging internet resources. Traditional methods, such as color charts, graphs, and models, which once described effective classroom instruction, are now considered outdated(Vavoula et al., 2007). The conventional approach of education confined to reading books, writing on the blackboard, and taking notes in textbooks is evolving with the integration of technology and digital resources(Ozdamli & Cavus, 2021).

The various digital technologies or ICT application in education are improving teaching productivity, developing online libraries, promoting distance learning, creating virtual classrooms, developing teamwork and communication skills, building curriculum and support materials, expansion of knowledge, video based instructional learning, and finally moving to hybrid teaching and learning(Haleem et al., 2022).

## 6. CHALLENGES OF DIGITAL TECHNOLOGIES IN EDUCATION

While digital technologies in education have brought about transformative changes, they also come with various challenges that educators, institutions, and policymakers must navigate. Understanding and addressing these challenges is crucial for harnessing the full potential of technology in educational settings. Educational institutions need robust technological infrastructure to support digital learning effectively(Al-Zboon, 2022). Insufficient or outdated infrastructure can lead to slow internet speeds, system crashes, and other technical issues that disrupt the learning process(Kesim & Ozarslan, 2012). Upgrading and maintaining the necessary infrastructure can be resource-intensive, especially for underfunded schools and institutions. Integrating digital technologies requires not only access to devices but also digital literacy skills. Some students and educators may lack proficiency in using digital tools, hindering their ability to navigate online resources, critically evaluate information, and engage in collaborative digital environments(Chittaro & Ranon, 2007). Bridging these digital literacy gaps is essential for ensuring that technology enhances rather than hinders educational outcomes. The use of digital technologies raises concerns about the security and privacy of student data. Educational platforms collect a significant amount of personal information, and the potential for data breaches or unauthorized access poses a serious risk(Bennett et al., 2012). Protecting student privacy and maintaining robust cybersecurity measures are paramount to ensure a safe digital learning environment. Integrating digital technologies effectively requires ongoing teacher professional development. Many educators may lack the training and support needed to navigate and incorporate new technologies into their teaching practices(Štemberger & Konrad, 2021). Adequate investment in professional development programs is essential to empower teachers to leverage digital tools for enhanced learning experiences. Excessive screen time and digital distractions can impact student focus and well-being. Striking a balance between using technology as an educational tool and avoiding potential negative effects, such as eye strain and reduced attention spans, is essential. Educators and parents need strategies to manage screen time effectively and promote a healthy balance between online and offline activities. The field of digital technology evolves rapidly, and staying abreast of the latest tools and trends can be challenging for

educators and educational institutions. Keeping technology infrastructure up-to-date and ensuring that educational practices align with current best practices require ongoing commitment and resources(Bennett et al., 2012b).

However, it's important to acknowledge that without adequate information and communication technology equipment, internet/mobile network connectivity, instructional resources, and teacher training, students may face barriers to participating in distance education. Individuals from resource-poor locations, isolated rural areas, and low-income households are at a higher risk of falling behind(Lewis et al., 2013). Learners with disabilities or those who speak a language other than English at home may require additional personalized assistance to ensure an inclusive educational experience(Mehrfard et al., 2021).

## 7. DISCUSSIONS AND FUTURE OF ICT IN EDUCATION

In the coming years, more companies will come which is either big and small, that focus on providing digital solutions to schools and colleges. This is expected to improve the quality of digital tools available across the country, making it easier for more people to access innovative educational technology. The goal is to break down language barriers and make learning resources in different regional languages more accessible online. Online and mobile learning programs are becoming popular, giving students and teachers access to a lot of information. While technology is going to be a big part of education, it's crucial that new teaching tools are used well. This will require a new generation of teachers who understand the importance of connecting with students in the classroom. This understanding can lead to a fulfilling and interesting career in education. Students who learn how to use new educational technology will have an edge in today's world and in the future. In the coming years, education trends will follow the growth of the internet and better network capabilities, making it easier to use new technology in classrooms. However, traditional teaching and learning in classrooms won't go away entirely. We are entering an era of hybrid teaching and learning, where both online and offline methods are combined to get better results and that can be termed as Education 4.0(Haleem et al., 2022).

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