



## Information and Communication Technology in Education: Implications, Policy, Challenges and Benefits

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### Abstract

As Information and communication technology gradually permeates daily life, they are profoundly changing the way education is conceived and delivered. ICT playing salient roles in business, workplace, entertainment, and mostly in education. Many people recognize ICT as catalysts for change, change in working conditions, handling and exchanging information, teaching methods, learning approaches, scientific research, and accessing information. Teachers play a key role in this transformation process; their beliefs, pedagogical practices and teaching skills are continuously challenged. ICT in the education process can significantly enhance traditional courses and Internet-based education. To be used as a lever for pedagogical innovation and institutional transformation, ICT teachers' competencies need to go beyond skills in ICT use per se and enclose contextual knowledge about technology, pedagogy and content. ICT exemplified by the internet and interactive multimedia are an important focus for future education and need to be effectively integrated into formal teaching and learning – especially in an educational institution. On the other hand, learners' engagement with ICT in education depends on their expectations and conceptions of learning and required assessment. Therefore, this article discusses the policy of ICT, key challenges and benefits of ICT in educational systems. The article concludes that regardless of all the limitations characterizing it, ICT benefits education systems to provide quality education in alignment with constructivism, which is a contemporary paradigm of learning.

**Keywords:** ICT, Education, Policy, Challenges, and Benefits of ICT

### Introduction

Information and communication technologies considerably facilitate the acquisition and absorption of knowledge, providing developing countries with unprecedented opportunity to improve educational institutions, improve policy development and implementation, and expand the range of opportunities available to businesses and the poor. One of the greatest hardships endured by the poor, and by many others, who live in the poorest countries, is their sense of isolation. The new communication technologies promise to reduce that sense of isolation and to open access to knowledge in ways unimaginable not long ago (World Bank, 1998).

All digital devices, tools, content, resources, forums, and services, as well as those that can be converted into or delivered through digital forms, that can be used to achieve the goals of teaching-learning, enhancing access to and reach of resources, building capacities, and managing the educational system, are defined as information and communication technologies (Rani, 2006). These will include interactive digital content, internet and other satellite communication devices, radio and television services,

learning management systems, and management information systems, in addition to hardware devices connected to computers and software applications. Procedures for digitisation, content deployment and management, development and deployment of platforms and processes for capacity building, and the creation of forums for interaction and exchange will all be included (John, & Sutherland, 2004).

Human society cannot exist without education; it is a critical lever for social preservation and economic prosperity. For many years, education was conducted in the same manner: the teacher spoke and acted, while students listened, watched, and wrote. Printing presses made textbooks readily available, and information traveled quickly; educational institutions sprouted up all over the world (Ajadi, 2019). However, the method education was delivered remained mostly unchanged and centered on the instructor. New technological devices for managing visuals and sound have opened up new opportunities for knowledge communication. Instead of hand-drawn illustrations, pictures could be used to communicate research topics

web-based content repositories, interactive forums,



(Johassen, 1991). Students learning foreign languages might listen to native speakers and practice their lessons at their leisure using audio recordings. A chemistry lesson could be illustrated with the visual transcription of a complex experiment using animated visuals and movies. Television advanced education by allowing lectures and seminars to be broadcast (Collins, & Halverson, 2009). The rapid expansion of the Internet, combined with the rise of computers and personal computers (PCs), has opened up a wide range of new applications and uses in education. The rapid advancement of information and communication technology (ICT) is forming a new world in which education at all levels can no longer be reduced to a group of students in a classroom listening to and watching a teacher with a textbook follow a set curriculum (Cuban, 2003). Learning is transitioning from teacher-centered to learner-centered as a result of ICT, and it can now be done at any time and in any location, from classrooms to offices and homes. Teaching and learning with ICT is still a work in progress, and its full potential has yet to be realized (Cuban, 2003; & Kirkwood, 2009).

Many governments have been concerned about the integration of information and communication technology (ICT) into education and the accompanying financial investments since the emergence of ICT. The measures that have been done to integrate ICT into education have necessitated the use of accurate and valid metrics to track these developments. The use of ICT in education is thought to enhance access to learning possibilities. It can help to improve the quality of education through enhanced teaching methods, increase learning outcomes, and enable education system reform or better management (Chan, et al., 2013).

"Information and communication technology" is what ICT stands for. It refers to telecommunications technologies that allow information access, such as the internet, wireless networks, cell phones, and other communication channels. It means that we have more opportunity to employ ICT in the classroom to improve teacher effectiveness. "ICT is a scientific, technological, engineering discipline and management approach utilized in handling information, its use, and association with social, economic, and cultural matters," according to UNESCO (2013). ICT is causing dynamic changes in society and has an impact on every part of life. Its effects may be seen in schools, which give students and teachers additional options for adjusting teaching and learning to individual

requirements. Society is driving schools to respond appropriately to this technological innovation (Oliver, 2002).

ICTs have changed the way people work today, and they are now changing the educational system as well (Watson, 2001). ICTs provide students and teachers more flexibility in adapting teaching and learning to individual requirements, and society is pressuring schools to respond appropriately to this technological innovation. ICTs play an important part in developing countries' equalization strategies; yet, the reality of the digital divide – the gap between those who have access to and manage technology and those who do not – has a considerable impact on how ICTs are used (Cloke & Sharif, 2001). The most difficult task is the implementation of ICTs at various levels and types of education, and failure to overcome the difficulties will result in a further widening of the knowledge gap and a deepening of existing economic and social imbalances between developed and developing countries. As a result, the purpose of this study is to discuss the policy, challenges, and benefits of ICT use in education, as well as the experiences of some countries' policymakers, school administrators, and teachers, in order to encourage policymakers, school administrators, and teachers to devote the necessary attention to integrating this technology into their educational systems. As a result, it emphasizes the benefits of ICT in education, as well as the possibilities and challenges of integrating technology into educational systems.

Computers and the internet offer interactivity and collaborative learning; but, if they are employed in learning presentations, their full potential as educational tools will be achieved. As teaching instruments, television and radio have been widely used. According to Perraton and Creed (2002), there are three general ways to using television and radio broadcasting in education:

- Educational Programming for Community (EPC) – National and international stations which provide general information and educational opportunities.
- Classroom Teaching (CT) – Broadcast substitutes for teachers to provide learning opportunities for listeners/ learners.
- School Broadcast (SB) – It provides complementary teaching and learning resources not otherwise available.



## Literature Review

Over the last decade, information and communication technology (ICT) has played a significant role in the transformation of schools, both administratively and intellectually, affecting the primary activities in schools. These are the functions of ICT in education, according to Jager and Lokman (1999):

- Learning about ICT so that students can use ICT in education, future occupation and social life.
- Use ICT as an assisting tool; such as, making assignments, collecting data and documentation, communicating and conducting research.
- Use ICT as a medium for teaching and learning, as a tool through which teachers can teach and learners can learn.
- Use ICT to organize and manage schools.

Technologies in education are advantageous and have been proved to assist with educational activities; yet, their design and usability are a concern (Anderson, 2006).

According to Ellis and Loveless (2013), education pedagogy is inextricably linked to academic accomplishment, the teaching process, and innovation. The study confirms that the potential impact of ICT in education cannot be underestimated. Chan et al. (2013) make a similar point, emphasizing the importance of information and communication technology (ICT) in democratizing secondary education and satisfying the changing needs of graduate students. A paradigm shift is required to bring about a change in teaching methods in education, which would suggest the adoption of student-centered approaches (Sari & Mahmutoglu, 2013). According to Iniesta-Bonillo et al. (2013), the use of information and communication technologies is important in engaging students and improving the effectiveness and efficiency of tutorial support. All major players in higher education have worked tirelessly to ensure that ICT is fully integrated into their educational system.

Governments and university administrations throughout the world have invested extensively in implementing information technology in their education systems, according to a report published by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute of Statistics (2013). Solar et al. (2013) suggest that incorporating ICT into the classroom improves the quality of learning and education. Gallego et al. (2014)

suggest that effective and robust implementation of ICT rules and regulations is required at all levels. Wastiau et al. (2013) claim that the use of ICT in education has good impacts, however Venkatesh et al. (2014) claim that there are no actual effects of ICT in education because all study is based on the socio-economic background of students and the school's embedded characteristics. Macharia and Pelsler (2014) looked at the effectiveness of education in Africa, while Wastiau et al. (2013) looked into it in Europe. All of these researches have yielded conflicting results when it comes to the association between ICT use and student performance.

## Information and Communication Technology in Education – Policy

Many policy reports have claimed that countries are transitioning from industrial societies to "information societies," in which knowledge development and transmission are critical (ERT, 1997). They argue that education must go beyond schooling to equip and assist citizens for lifetime learning in order to eliminate social exclusion and sustain competitiveness in a global economy (ERT, 1997). ICT, it is believed, may play an essential role in redefining education to meet the needs of today's information society. It is also expected that ICT in education will close the gap between socioeconomic reality and educational system results (ERT, 1997). Given the difficulties the international community faces in meeting the Millennium Development Goals (MDGs) and Education for All (EFA) targets, it appears unrealistic to expect traditional delivery mechanisms to provide quality and equal educational opportunities for all in an affordable and sustainable manner.

Traditional educational issues are exacerbated by the fast-changing skills in demand in an increasingly globalized labor market. In addition, new paradigms are emerging in which education delivery becomes less about teaching and more about learning. Education is becoming less constrained to a single geographical location of learners and less reliant on a physical facility, such as a classroom, to bring a critical mass of students together. ICT is thought to have a huge impact on expanding learning opportunities for a larger and more diversified population, across cultural barriers and beyond the confines of educational institutions or geographical boundaries (Haddad & Draxler, 2002).



### Operational Definition of Terms

- 1. Blended Learning:** It refers to learning models that combine the face-to-face classroom practice with e-learning solutions, such as a teacher may facilitate student learning in class contact and uses the model (modular object-oriented dynamic learning environment) to facilitate out of class learning.
- 2. Constructivism:** Is a paradigm of learning that assumes learning as a process individuals 'construct' meaning or new knowledge based on their prior knowledge and experience (Johassen, 1991). Educators also call it the emerging pedagogy in contrast to the long-existing behaviourism view of learning.
- 3. E-learning:** Is a learning program that makes use of an information network such as the internet, an intranet (LAN) or extranet (WAN) whether wholly or in part, for course delivery, interaction and/or facilitation. Web-based learning is a subset of e-learning and refers to learning using an internet browser such as the model, blackboard or internet explorer (Tinio, 2002).
- 4. Information Communication Technology (ICT):** In this review, articles refer to the computer and internet connections used to handle and communication information for learning purpose.
- 5. Learning-centred learning environment:** This is a learning environment that pays attention to knowledge, skills, attitudes, and beliefs that learners bring with them to the learning process where its impetus is derived from a paradigm of learning called constructivism. In the context of this article, it means students personal engagement to the learning task using the computer and or the internet connection.
- 6. Open and Distance learning:** Open and distance learning is defined by the Commonwealth of Learning as a way of providing learning opportunities that are characterized by the separation of teacher and learner in time or place, or both time and place; learning that is certified in some way by an institution or agency; the use of a variety of media, including print and electronic; two-way communications that allow learners and tutors to interact; the possibility of occasional

face-to-face meetings; and a specialized division of labour in the production and delivery of courses'.

To effectively harness the power of the new information and communication technologies (ICTs) to improve learning, the following essential conditions must be met:

- Students and teachers must have sufficient access to digital technologies and the Internet in their schools, classrooms, and education institutions.
- Teachers must have the knowledge and skills to use the new digital tools and resources to help all students achieve high academic standards.
- High quality, meaningful, and culturally responsive digital content must be available for teachers and learners.

### Information and Communication Technology in Education – Challenges

Planning, infrastructure, learning content and language, capacity training, and financing are some of the obstacles that Information and Communication Technology (ICT) in education systems may confront. ICT-enhanced education necessitates clearly specified objectives, resource mobilization, and political commitment from the relevant agencies. Policymakers must be aware of the capabilities of ICT in various contexts and for various objectives (Oliver, 2002).

A lack of support from education officials has hampered many instructors' or students' efforts to use ICT in education. Administrators must be proficient in the use of technology and have a thorough awareness of the technical, curricular, administrative, financial, and social components of ICT use in education for ICT initiatives to be effective and sustainable (Rani, 2006). In addition, technical support specialists, whether offered by in-school personnel or external service providers, or both, are critical to the long-term success of ICT use in a school. While an institution's technical support needs are ultimately determined by what and how technology is deployed and used, general abilities in the installation, operation, and maintenance of technical equipment, network administration, and network security are all necessary. Technical breakdowns can cost a lot of time and money if you don't have technical help (John & Sutherland, 2004).

The use of ICT in education is also challenged by learning content and language. Educators often





neglect the need of content development. The relevance of the learning content to the target groups must be considered. The generation of content is a crucial area that is all too frequently disregarded. The majority of existing ICT-based instructional materials are likely to be in English or have little relevance to developing-country schooling (especially at the primary and secondary levels). Original educational content (radio programs, interactive multimedia learning materials on CDROM or DVD, Web-based courses, etc.) is needed, as well as adaptations of existing content and conversions of print-based information to digital medium. Content development specialists including instructional designers, scriptwriters, audio and video production specialists, programmers, and web developers are needed to complete these jobs. Financing is also a significant barrier. ICT in education necessitates a significant capital investment, and developing countries must forecast the benefits of ICT use in order to balance the cost against available alternatives. Grants, state subsidies, fund-raising events, in-kind support from volunteers, community support, revenues obtained from the primary business, and revenues earned from supplementary activities are all indicated as potential sources of money and resources for ICT use (Tinio, 2002).

### **Information and Communication Technology in Education – Benefits**

The benefits of ICT are causing significant changes in teaching methods and student learning. Schools in the Western world have made significant investments in ICT infrastructure, and students are using computers more frequently and for a wider range of purposes (Volman, 2005).

Several studies have found that students who use ICT facilities make more progress than those who do not. Students who used computer tutorials in mathematics, natural science, and social science, for example, scored much higher on these courses' assessments and examinations (Kulik, 1994). The use of ICTs in education leads to more constructivist learning, increased activity, and increased student accountability (Volman, 2005). This limits the teacher's duty to assisting, advising, and coaching students rather than simply passing on information. Learning about computers becomes learning about computers, and then learning about computers becomes learning with computers. In the classroom, ICTs have an impact on instructional practices.

According to Kozma (2005), there are three major considerations to address when it comes to the impact of ICTs on education. First, there are student results, such as improved grades in school or the acquisition of whole new skills required in a developing economy. Second, teacher and classroom outcomes - increased attitudes about teaching and growth of instructors' technology skills and awareness of new pedagogical approaches. Finally, improved school innovation and community members' access to adult education and literacy.

ICT allows students and teachers, as well as academic and non-academic personnel, to communicate efficiently throughout formal and informal teaching and learning (Yusuf, 2005). Teachers must be trained not just in computer literacy, but also in the use of many types of instructional software in the classroom (Ololube, 2006).

According to Hadded and Draxier (2005), ICT contributes to educational development and effective learning by increasing access, increasing efficiency, boosting teaching quality, and improving management systems. Teaching and learning can be improved through the use of technology by increasing student accomplishment and offering access to a wide range of educational materials (Roberts, 2000). ICT facilitates learning by bridging the gap between teachers and students. improves students' socio-cultural behavioural patterns, increases students' ethical awareness of community norms and existing moralities, acts as a change agent, and aids in the dissemination of ideas, educational materials, and instructional resources (Obunadike, 2010). The use of computers and other information technologies in the classroom is known as pedagogical application of ICT (Olakulehin, 2007).

ICT allows for the sharing of resources, expertise, and advice, greater flexibility in when and where tasks are completed, improvements in ICT literacy skills, confidence, and enthusiasm, easier lesson planning and presentation, and access to up-to-date student and school data at any time and from any location (Yusuf, 2005).

### **Digital Resources for Education**

ICT-enabled teaching and learning encompasses a wide range of strategies, tools, content, and resources targeted at increasing the quality and efficiency of the teaching and learning process. There are a range of alternatives accessible to the teacher to use various ICT resources for effective pedagogy, ranging from projecting media to complement a class



to multimedia self-learning modules, simulations, and virtual learning environments (John & Sutherland, 2004). Each of these devices or strategies entails modifications in the classroom environment, which have an impact on effectiveness. The availability of a diverse set of such teaching and learning materials will help transform classrooms into ICT-enabled environments. Teachers will be involved in the selection of digital content and resources as well as their critical evaluation. They will also be encouraged to expand their digital resources and share them with their peers via digital repositories.

There are three types of ICT objects that can be utilized in the classroom, all of which are complementary: The first group includes stand-alone digital components that can be utilized to enhance learning in a course for didactic and/or assessment purposes. Video clips (such as YouTube fragments), illustrations (such as photos and drawings), simulations (such as simulations of an organizational process or an electronic circuit), and interactive assessment resources (such as a quiz) are all examples of Digital Learning Material (DLM) or Learning Objects (Polsani, 2006). (Kreijns, Van Acker, Vermeulen, & Van Buuren, 2013).

General communication and information dissemination tools, such as Simple Syndication – RSS, blogs, chat and voice over, peer to peer file sharing, web conferencing, and social networks, fall under the second category. These tools were not created with the intention of being used in the classroom; rather, they can assist teachers by providing communication capabilities in pedagogical contexts (Kreijns et al., 2013).

The third category includes course management software. These complicated technologies, often known as Learning/Course Management Systems (LMS or CMS), are educational software packages for online course administration and delivery (Morgan, 2003). Web-Based Learning Systems (WBLS), Virtual Learning Environments (VLE), or more simply, learning platforms are used in course content organization and presentation, teacher and learner communication, class activity management, school tests and examinations (assessments), and students recording and grading. Simple learning objects (such as a video sequence or a quiz) can be combined to create more complex instructional resources, which can then be distributed separately on a CD-ROM or interactively online.

## Conclusion

ICT in education is today viewed as both a necessity and an opportunity around the world. Without a question, ICT is revolutionizing schooling. Academics must re-evaluate their own views and pedagogical methods on teaching and assessment, as well as their potential impact on learners' accomplishment, in order to fully profit from this current revolution. Teachers and students must comprehend how ICT should be integrated into education, why e-learning activities should be pursued, and what benefits may be expected. Individual and organizational ICT skills and knowledge for educational purposes is the foundation for modern civilizations to reinvent teaching and learning in the age of technology. The challenges of ICT in education are to familiarize instructors and students with the use and functioning of computers and related technologies, as well as the social, ethical, technological, and electrical challenges, to name a few.

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