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Impact of ICT on Teaching and Learning: A Literature Review

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Abstract: **The initiation of Information and communication technology has made tremendous changes in the present day world. There is no area that has not been influenced by this digital phenomena. The advent of ICT in education helped to improve the quality of education where teaching and learning eventually became an engaging active process related to real life. The present study intends to collate the findings from a review of an array of available literature related to the impact of ICT on education. Twenty-first-century teaching learning skills emphasise the need to transform the conventional teacher-centered pedagogy to more learner-centered methodology. Active and collaborative learning conditions facilitated by ICT helps to develop a knowledge-based student community. The present literature review gives an over view of the use of ICTs in the field of education focusing on its impact on teaching learning process, quality and accessibility of education, motivating learners, learning environment, and students' academic performance.**

Keywords: **ICT integration, ICT in Education, ICT for Education, motivation, learning Environment, Academic performance, accessibility.**

I. INTRODUCTION

The term Information and Communication Technology (ICT) is a broad and comprehensive expression. It is not restricted to the computers or the internet alone. It ranges from the use of FM radio to satellite for communication. [1] Opines that ICTs are the fundamental building blocks of the present day society. The contemporary society is highly influenced by ICTs in every aspect of life, including education. The effects are experienced more in the field of education since it has the potential for teachers to transform the teaching methodology to meet individual needs [2]. Today, schools are under pressure to adapt to this technological innovation. ICT provide remarkable opportunities for developing countries to enrich their educational system since it can help in acquiring and assimilating knowledge [3]

The importance of ICT has been recognized by educational institutions worldwide. [4] Asserts that ICT has influenced the way people function today, both personally and professionally, which demands change in the educational arena. Schools that train their students in yesterday's skills and outdated technologies are not meeting the needs of tomorrow's world. Such children will not fit into tomorrow's professional requirements. According to ITU (Telecommunications Standardization Sector), ICTs can act as a facilitator in promoting learning skills, when implemented and utilized effectively. Effective use of ICT is crucial to countries that are progressing towards information or knowledge-based society.

ICT is a pivotal tool in spreading quality education . According to Kofi Annan, the former General Secretary of the United Nations, ICT helps to achieve the aim of Universal Primary Education by 2015; since it can take learning beyond the four walls of the classroom. This implies the vital role played by ICT in the educational sector. The application of information and communication technologies in education has been divided into two main categories: ICTs for Education and ICTs in Education. ICTs for education identifies the development of information and communications technology especially for teaching-learning purposes while the ICTs in education includes the adoption of basic elements of information and communication technologies in the teaching-learning process. ICT provides great flexibility in education to ensure that learners are able to access knowledge anytime and from anywhere. It also affects the way knowledge is imparted and how students learn.

Research undertaken worldwide has confirmed that ICT can help to improve student learning by providing better instructional techniques [5], [6] .A report made by the National Institute of Multimedia Education in Japan, concludes that students' exposure to ICT through curriculum integration has a positive impact on their achievement with regard to knowledge, reasoning and presentation skills in various subject areas.

II. ICT INTEGRATION ENHANCE TEACHING AND LEARNING

The application of ICT is creating significant changes in the teaching and learning process. The traditional approach in teaching has stressed on content. For decades course materials were designed around textbooks. Teachers taught the content through lecture method and the activities were designed to enforce the content knowledge [7]. Present day teachers need to create relevant and intriguing learning experiences for their students .Technology provides a remarkable role in making education inclusive since it has the potential to improve educational performance of students. Furthermore, utilization of ICT facilitates learner-centered approach rather than conventional teacher-centered pedagogy. The present day curricula promote aptitude and performance of the learners, emphasizing on the application of the information rather than factual knowledge. ICT facilitates the dissemination of knowledge based on the contemporary curricula [8]. As a result, incorporating ICT in teaching helps both teachers and students since it has the potential to impart quality education if it is used effectively.

ICT-enhanced learning stimulates augmented learner involvement. The constructivist method views learning as realistic and learner-centered. ICT is an effective tool in constructivist approach of learning, where teachers can layout simulated and tailor-made learning conditions to students [9],[10]. In this regard, applying educational technology as a constructivist device can help students to display their ideas, express their knowledge, examine, exploit, and process information, in a collaborative learning environment ([11],[12]. For instance, software applications like databases and excel sheets foster inquiry-based learning activities . Multimedia is a powerful tool that assists thinking activities of learners and also helps them to share and express their knowledge . These software applications help students in understanding the concept by doing . It also facilitates in developing an independent approach towards problem -solving. In that sense computers help students in developing high order thinking [13],[14]. [15] Also went in the same direction by stating that ICT integration helps in Constructivist learning where students interact with other learners, the teacher, sources of information, and technology . Such an atmosphere provides the learner with direction and settings to build their knowledge and skills. It also gives a rich collaborative learning condition providing the learner to mull over different perspectives in dealing with issues and solve problems [15], [16].ICT also facilities collaborative learning. [17](p.407), Points out that "the flexible time-space accounted for by the integration of ICT into teaching and learning processes contributes to increasing the interaction and reception of information. Such possibilities propose changes in the communication models and the teaching and learning methods used by teachers, giving way to new scenarios which favour both individual and collaborative learning".

Teachers play a crucial role in integrating ICT. The present day teachers should know not only the content of their subject but also the pedagogy to impart the knowledge effectively by integrating technology. According to [18] in order to integrate ICT in teaching teachers must recognize the usefulness of technology, they should believe that the application of technology does not disrupt the classroom climate. Moreover, they should also have the confidence to manage technology. Nevertheless, research studies indicate that majority of the teachers do not take advantage of the potential of ICT to promote the quality of learning, even though they have a favorable attitude towards it [19], [20], [21], [22] . [23],[24] Aver that the ICT 's potential can be exploited only if confident teachers are ready to make use of the opportunities for transforming their classroom practices by utilizing ICT effectively. Thus, "ICTs are exerting impacts on pedagogical approaches in the classrooms. Their contribution to changes in teaching practices, school innovation, and community services is considerable" [25]

III. ICT ENHANCES ACCESSIBILITY TO LEARNING

Education is not just teaching students based on prescribed syllabus in the four walls of a classroom. It has much border objectives, goals as well as other concepts. Hence, Classrooms without borders needs to be the concept of the contemporary education system. ICT is an answer to this concept. It helps to deliver education anytime and from anywhere [26], [27]. It also affects the way knowledge is imparted and students learning process since learning will be effective if only the strategies are learner driven rather than by the teacher.

ICT provides a great flexibility in education to ensure that learners are able to access knowledge regardless of space and time [28], [7].As a result, it can foster the educational needs of special needs students since it can be utilized at their own

pace [29]. [30] Observed that using ICT helps students to communicate, share ideas, and work as a team anywhere, anytime. This includes teleconferencing classroom where students around the world are invited to meet together for discussion related to a specific topic. Under such circumstances students besides acquiring knowledge collectively, also share their learning experiences, which enable to express themselves and contemplate on their learning. ICT also helps to involve the students in a global collaborative learning .The Machinto Project, a K–12 literature-based iEARN program of Backley and Takagi is a good example in this regard. The facilitators of this program use ICT, such as Web conferencing and wikis, to connect students to their peers in other countries and cultures. This also helps in establishing connections and achieving true and meaningful learning. Moreover, it lends purpose to lessons and drives "just-in-time" learning for teachers as well as students as they become co-learners [31]

Distance education programmes, which are very popular these days gained momentum because of ICT. Mobile technologies and immaculate communications technologies support 24/7 teaching and learning process. The time duration will be utilized within the 24/7 time frame which will be a challenge that educators face in future [31] .Hence, the ICT-empowered education system will eventually result in the democratization of education, predominantly in developing countries like India. Effectual utilization of ICT for the educational purpose will be able to bridge the digital divide that exists in the nation today.

The need for spreading education in developing countries like India has gained impetus since education remains an important platform of social, economic and political mobility of individuals [32]. According to [33], there are several impediments exist in India, such as socio- economic, physical, linguistic and infrastructure, for individuals who wish to access quality education. The Same scenario can be seen in most of the developing countries where there is a lack of learning resources, poor educational facilities, lack of teachers and high rate of dropouts [34]. ICT can be a solution to these problems since it has the potential to overcome the barriers of lack of teachers, lack of quality education, as well as geographical hindrances [35].

Since technology is changing constantly, Individuals should have to keep pace with the recent developments in order to access information through ICT [36] . ICT helps to reduce communication obstacles like space and time [37]. ICTs also make it easy for the development of electronic resources such as electronic libraries where the students, teachers and experts are able to access research information and study materials from anywhere at their own pace [33, [38]. Such conveniences provide exposure of academics and research scholars in sharing scholarly material.

IV. ICT ENHANCING THE LEARNING ENVIRONMENT AND MOTIVATION

ICT is a powerful tool for promoting educational opportunities. It is transforming the processes of teaching and learning environment by including elements of vitality to the learning milieu. Present day education system insists on research, critical thinking, and evaluation skills since students have access to large variety of sources to get information [39]. Hence, the learning environment provided should follow an effective application of knowledge that students are required to master, in order to avoid the attained knowledge being passive [40], [41] .Furthermore, teachers need to encourage students to be active learners so as to engage in active knowledge construction. This entails open-ended learning situations rather than a learning condition which focus on the sheer transmission of facts [42], [43], [44].

ICT has the potential to create powerful learning environments in various ways. It has the potential to access numerous information using various sources. It also helps in examining information from different perspectives, thus promoting the credibility of learning environments [45] . Furthermore, ICT may also help to understand complex concepts through simulations, contributing to an authentic learning environment. Consequently, ICT functions as a facilitator of active learning and high-order thinking [46],[47].

Moreover, ICT can also function as an instrument of curriculum differentiation .It promotes opportunities to modify the learning material and activities to the requirements and capabilities of every individual learner, particularly by giving personalized feedback [48], [49], [28] . As [50] emphasize, ICT might appeal to an array of educational techniques, ranging from traditional to ingenious.

ICTs are also transformational devices, if used effectively, can shift the classroom atmosphere to a learner-centered environment [45], [51], [7].Therefore, It is necessary to equip the classroom with computers in order to enhance the learning opportunities for students through different curriculum activities . ICT environment develops the experience of both teachers and students so that they can utilize the learning time effectively [52]. Hence, ICT-enriched learning is a motivating factor for both teachers and learners [36].

ICT can strengthen the quality of education in different ways. It can boost up the learner motivation and involvement, by providing the opportunity to gain basic learning skills. Multimedia computer software can be used to provide an audio-visual effect which helps to create interest and engage students in the learning process. Interactive software applications can also help students to get engaged in the lesson activities.

Research prove that students using ICTs for learning purposes are engaged in the process of learning . Since ICT can alter the learning tasks and nature of problems, it acts as a mediator of cognitive development, augmenting the acquisition of basic cognitive competencies which are essential in a knowledge society. [10] stated that students utilizing ICTs for educational purposes get immersed or involved in the process of learning . As a greater number of students utilize computers as a source of information and as an intellectual device the impact of the technology on promoting student learning will develop constantly .Computers with Internet access can enhance learner motivation since it incorporates the media opulence and interactivity of different ICTs. It gives an opportunity to connect with real people and to get involved in real life situations. This is often stated as a reason influencing "ready adaptors of ICT" [53], [54] .Consequently, the application of ICT in teaching and learning will not only improve the learning environments but also help next generation for their future lives and careers [55].

V. ICT ENHANCING ACADEMIC PERFORMANCE

The relation between ICT integration and student performance has been the topic of research and discussion for the last two decades. [56] Believe that ICT improves the performance of students since technology helps to improve teacher-students interaction . [57] Meta-analysis study pointed out that, in general, students who used computer-based learning scored higher than students who learned without computers.ICT integrated learning helps students to grasp the concept better and also retain it for a longer period of time . ICT also help students to develop a positive attitude towards learning since they are engaged in the learning process .

[58] Analyzed the international data from the Programme for International Student Assessment (PISA) . The findings revealed that there is a significantly positive correlation exist between the availability of ICT and students' performance .However, the correlation becomes weak and insignificant when other student environment factors are taken into consideration. Similarly,[59] studied the correlation between having a home computer and students' academic performance. Approximately 64,300 students in the United States took part in the study. The results revealed that students who have access to a computer at home for educational purposes have performed well in reading and math. Likewise, in a study conducted by [60] on 75 students in the United States divulge that students who used computer tutorials in Mathematics, Science and Social Studies performed very well in the test. The author also stated that computer tutorials on reading helped elementary students to improve their reading skills.

[61] Opined that "first, web-based instruction presents information in a non-linear style, allowing students to explore new information via browsing and cross-referencing activities. Second, web-based teaching supports active learning processes emphasized by constructivist theory. Third, web-based education is enhanced understanding through improved visualization and finally, the convenience, it could be used anytime, at any place". Thus, ICT helps to intensify students' content knowledge, involving them in building their own knowledge of the topic, and also help them in the development of high order thinking skills [57] [62], [63]. ICT-enhanced learning is student directed and homiletic. Unlike inert, text books or any other printed course material, ICT-enhanced learning identifies that there are different learning techniques and types of knowledge.

Several studies have recognized that ICT helps in developing constructivist learning techniques which changes students' approach towards learning as well as the content material [64]. [65], [66] Encourage the utilization of asynchronous CMC devices to enhance student self-efficacy which improves their academic performance. [67] also illustrates the potential of tablets to enrich mathematics instruction. Therefore successful integration of ICTs facilitates collaborative and constructive learning, which promotes the academic performance of students.

VI. CONCLUSION

This literature review explored the impact of ICT in the present day education system. ICTs have influenced educational practices to some extent and will increase considerably in future. ICT will become a powerful agent in transforming several educational practices . Persistent application and development of ICTs in the education system will have a strong influence on teaching learning process, accessibility of education, motivating learners, creating a congenial learning environment and improving academic performance.

ICT integration in education has a positive impact on both teaching and learning process. Technology makes a lot of difference in the delivery of lessons or even education at large. ICT has the potential for a wider accessibility to educational resources. Furthermore, it enhances flexibility, so that, students can have access to learning irrespective of time and geographical limitations. It can also have an impact on the way students are taught in the classroom and the way they learn. It helps to motivate the learners by creating a rich learning environment by providing new opportunities for both teachers and students. These opportunities can have a significant influence on students' academic performance and educational achievement. Likewise, broader availability of good educational practices and educational programs, which can be shared through ICT, can enhance the spread of best education system .

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