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The Role of ICT Integration to Support and Enhance the Teaching- Learning Process in the Contemporary Education System

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Abstract

Today, Information and Communication Technology (ICT) plays an essential role in daily life. Information and Communication Technology is a prolonged term for Information Technology (IT) that delivers access a different kinds of information through telecommunication. It is mainly based on communication technologies. It also incorporates the computer system, audio-video display, mobile, and the Internet. Information and Communication technology is used in most fields such as Education, Agriculture, Medicine, Defense, E-governance, e-commerce, Banking, Transport, etc. The application of ICT has brought about distinctly radical technological, Social, and economic changes. These Changes have caused educational institutions, administrations, and teachers to reexamine their roles, teaching, and vision for the future. The use of ICT has changed strategies for working by both teachers and students in teaching and learning processes. In this study, researchers have to explore the benefits of Information Communication Technology use in the education system, in the enhancement of the teaching and learning process. A qualitative research method was employed in this study. The study was theoretically analysed with the help of various article reviews, journals, books, and newspapers, etc**.** It also highlights the limitations of using ICT, key initiatives, and challenges faced by higher education institutions and the government. to enhance the whole education system.

KEYWORDS: ICT, Education System, Roles of ICT, Teaching-Learning Process, Advantages and Disadvantages of ICT, ICT Initiatives in India.

1. INTRODUCTION:

ICT Stands for Information and Communication Technology (ICT), which includes all technologies for the manipulation and communication of information (Swati Desai, 2010). Information and Communication Technology (ICT) is a progressively good-looking required part of our Education System. Recently, ICT has become a universal use in the whole society and also the educational system (Savov, Terzieva, Todorova, and Kademova-Katzarova, 2017). It can be considered as a subfield of Educational Technology (E.T.) which emphasizes the provision of various methods and strategies to improve our Teaching and Learning Process. The digital-based technology has influenced all aspects of human life and has produced many changes in society. On the other hand, the teaching –learning environment among the educational institutions also came under the influence of highly digitalized techniques of ICT (Kaur, S, 2017). ICT signifies one of the up-to-date applications of technology towards the teaching- learning

process. It helps to facilitate the transaction between producers and users by keeping the students updated and enhancing teachers' capacity and ability, fostering a live contact between the teacher and the student through e-mail, chat sessions, etc. ICT has transformed the style of functioning of the educational system and its governance (Amutha D, 2020). According to (Saxena, N, 2017), ICT is an asset that has many aspects of the way we live, and also an electronic means of capturing, processing, storing, and communicating information. As per as the origin of term Information and Communication Technology (ICT) is concerned, the credit goes to U.S.A (United State of America) where the term "Information Science" (earlier called as Information and Communication Technology) was first introduced in 1950 for the effective handling of the interchange of scientific information among the scientists in U.S.A and Foreign Countries. Letter on, around 1960 it was began to be used in the field of industry and now today we witness its wide uses in all fields and walks of our life, including Education and Instruction. ICTs for their better understanding and application to the Teaching and Learning process may be properly classified into two categories. Namely- i) Traditional Technology like printed media, verbal information, radio, television, audio-visual aids etc. and ii) Modern Technology like internet, digital video camera, multimedia personal computer (MCP), world wide website (www), Computer Mediated Video (CMV), audio conferencing, virtual classroom, digital libraries, PowerPoint simulation, telecommunication and multimedia projector etc. The ICT is not a single technology like traditional technologies; they are a combination of hardware and software, media, and delivery systems. So, in the meantime, the existing digital platforms and ongoing ICT-based educational initiatives must be optimized and expanded to meet the current and future challenges in providing quality education for all. The Uses of ICT in Education have made the teaching and learning process very interesting and stress-free for the teachers as well as the students. Students have enthusiasm to learn through ICT and out of curiosity and interest; they learn better (Kler, S, 2014). The use of ICT in education has come up as a new revolution that has significantly changed the whole concept of education. The new technologies have provided an effective platform for education in the present day, which has helped in the enhanced and better interaction between the teacher and the students, and this has provided new opportunities to the teaching-learning process. So, ICT in education has the prospective to bring about influential changes to the teaching-learning process. The recent rise in COVID-19 pandemic requires that we be ready with alternative modes of quality education through an ICT platform. Because of this period many schools, colleges and universities have decided to suspend the offline classes or institute campuses during pandemic. And this period, there have no face-to-face interaction with teachers- students, no collaborative learning with peer' groups as the high rate of mental stress, anxiety, and uncertainty among the whole student' community in responding to the increased concerns surrounding COVID-19 pandemic. In this time, ICT has a major role play in our whole education system, basically in the teaching-learning process. In the 21st century needs the suitable application of ICTs like video tapes, television and multimedia computer software that combine text, sound and colorful moving images which can be used to provide challenging and authentic content that will not only engage the student in the learning process but as well make learning concrete (Adesote and Fatoki, 2013). The application of ICT in higher education is highly beneficial as it provides opportunities for instructors and students to operate, store, process, and retrieve information, encourage independent and active learning, as well as motivate instructors and students to continue learning outside the school. The innovative ICT enables self-paced learning through various tools such as assignments, computers, laptops, and mobile devices. As a result of this, the teaching learning initiative has become more productive and meaningful (Sharma, Gandhar, Sharma, and Seema, 2011). Hence, ICT has the potential to engage students in learning

activities to increase their learning, but also helps them solve complex problems and enhance their academic performance and cognitive skills. And it promotes active learning, sharing of ideas, discussion, and also provides immediate feedback between the teachers and students. In a modern scenario, ICT in education is highly tech and highly potential to bring about influential changes in of teaching-learning process, and a competitive society will sustain only through the knowledge of ICT. According to definition, ICT is an 'electronic means of capturing, processing, storing, communicating information and it is an umbrella term that includes any communication device surrounding a series of modern technologies as well as the various services and applications associated with them, such as video conferencing, audio conferencing and online learning etc. Thus, the list of ICT machineries is comprehensive, and it continues to grow. Some components, such as computers, radios, and telephones, have existed for decades. Others, such as smartphones, digital TVs, and robots, are more recent entries. So-called ICT as a gateway to support, reform, and enhance the Teaching- Learning Process in the Contemporary Education System.

1.1.THE ROLE OF USING ICT IN THE TEACHING-LEARNING PROCESS:

ICTs are a potentially powerful tool for spreading educational opportunities in our contemporary education system. According to Bhakta and Dutta (2016), Information technology can speed up information delivery, so this ability can be used to improve the teaching-learning environment. Information and Communication Technology is an extended term for Information Technology (IT), which is a technological foundation to make information accessible at the right time, right place, in the right form to the right operator. Previously, one had to wait for the newspapers to get the information across the world. Today, with clever technology, information can be accessed from anywhere using smartphones, computers, mobile and gadgets, etc. According to Budhwar (2017), Information and communication technology (ICT) is a boon for students today as it has a significant effect on student achievement. ICT includes television, computers, the internet, etc. Once used appropriately, it can strengthen, increase, and raise the quality of education. On the other hand, she said that Science and technology are likely to be key elements of strategies to develop ICT as a resource for promoting teaching and learning. Therefore, ICT can improve creativity and problem-solving capability in students. Altogether is made possible with the help of Information and Communication Technology. Information technology has been influencing our lives in recent years in the fields of education, healthcare, and business, etc. With the rapid development of ICT in the 1990s, people started to pay more attention to its impact on social development. The term ICT application came into being and began to be popularized. The application of ICT in higher education is highly beneficial as it provides opportunities for instructors and students to operate, store, process, and retrieve information, encourages independent and active learning, as well as motivates instructors and students to continue learning outside school hours. On top of this, it has the potential to not only engage students in learning activities to increase their learning, but also help them solve complex problems and enhance their cognitive skills. According to Anu Sharma et al. (2011), appropriate use of ICT can transform the whole teaching-learning process, leading to a paradigm shift in both content and teaching methodology. Thus, ICT is a medium of Teaching and Learning, which refers to the tool for teaching and learning itself. More than three eras ago, computers and related information technologies were introduced to educators for direct teaching and learning purposes. It is consistent with CAL/CBT/CAI, then moved to Multimedia courseware, and lastly to Web-Based instruction & Computer Mediated Communication (CMC) system as well. CAI for using drill and practice of basic skills can be highly effective according to a large body of data and a long history of use (Kulik, 1994). Students typically learn more and learn faster in courses that use computer-assisted instruction (CAI). This has been exposed to be the case across all subject areas,

from preschool to higher education, and in both regular and special education classes. And effective instruction requires presenting information, guiding the learner, practicing, and assessing student learning. The practice of a computer to provide any combination of these features may be called Computer-Assisted Instruction. It must be noted that there is no requirement that the computer provide all of these elements. Somewhat, any combination of these can be a suitable computer intervention in the teaching-learning process. Interactivity, flexibility, and learner control are the mark of these technologies. The proper application and utilization of educational technologies in instruction has developed beyond the use of basic drill and practice software, and nowadays includes the use of multifaceted software products and advanced networking technologies. Currently, students use multimedia to learn interactively and work on class projects. They use the internet to do research, engage in projects, and communicate with others. There are many factors influencing the use of ICT to make teaching-learning effective in higher institutions of learning in the 21st century.

2. EMERGENCE / SIGNIFICANCE OF THE STUDY:

ICT plays the role in our information and communication process and its outcomes, as played by other technologies in making our life comfortable and purposeful. ICT in education has marvelous potential to assist and help the people connected with the process and product of education in numerous ways. The present scenario of the classroom is changing through the use of ICT. Students can learn from multiple sources, and for this aim use of ICT & Multimedia is very much essential in the educational field, and simultaneously, teachers' knowledge of ICT and Multimedia is also required. The use of ICT brings about a paradigm change in outdated styles, views, and methods of teaching — learning process. ICT is the conveyance of the present educational system in line with the knowledge-based, information-rich society by providing facilities of sophisticated tools, techniques, and methods at its disposal. ICT has support in transitioning from a broadcast model of learning to collaborative learning. Thus, making the students very active and participating in the teaching — learning process. It helps in the process of transitioning from teacher-centred instruction to learner-centred instruction. And students become independent and self-directed in gaining and application of knowledge, potentiality, and skills. ICT enables students to become more responsible about their learning as they seek out relevant information and knowledge through their efforts, synthesize and share their knowledge with others. As a result, ICT makes them realize their educational potential and capabilities. On the other hand, ICT prepares teachers to meet the challenges of the teaching-learning task of the modern age. Hence, it helps teachers and other personnel in the appropriate execution of their multi-dimensional roles and responsibilities in several areas of the education system. Therefore, the researchers need to investigate this study to explore the role of ICT integration to support and enhance the Teaching- Learning process. And also need to explore how to help students meet the emerging trends and properly utilize the technological resources. So, the present study has great need and significance because this study demonstrates the roles of ICT integration to support and enhance the Teaching- Learning process in the Contemporary Education System.

3. OBJECTIVE OF THE STUDY:

The main objective of the present study is-

- To explore the role of ICT to support and enhance the Teaching-Learning process in the 21st Century.
- To explore the significant advantages and disadvantages of ICT in the Teaching-Learning process.

- To describe major ICT initiatives and integration in the Indian education system, which are making the teaching-learning process effective?

4. RESEARCH QUESTIONS:

- How does ICT support and enhance the teaching-learning process in the 21st century?
- What are the significant advantages and disadvantages of ICT in the teaching-learning process?
- What are the major ICT initiatives and integration efforts in the Indian education system that contribute to making the teaching-learning process more effective?

5. STATEMENT OF THE PROBLEM:

The research problem may be entitled ***"The Role of ICT Integration to Support and Enhance the Teaching- Learning Process in Contemporary Education System".*** This study examines researchers' investigations to discuss the benefits of Information Communication Technology (ICT) use in education, in the enhancement of the teaching and learning process. It highlights the effects and benefits of ICT in education, its limitations, and challenges to education systems.

6. RESEARCH METHODOLOGY:

In this study, researchers adopted a qualitative method for exploring the role of ICT in the learning-teaching process in the 21st century. And has been carried out through secondary data sources like different books, Articles, reviews, Journals, theses, Expert opinion, and websites, etc.

7. DISCUSSION OF THE STUDY:

7.1.Benefits of using ICT in the Education System

The use of ICT is creating key changes in the learning of students and teaching methods. On the other side, ICT is a potentially powerful tool for spreading educational opportunities. Numerous studies have shown that students using ICT facilities mostly show higher learning gains than those who do not use them; actually, it acts as an assisting tool. ICT provides faster and easier access to more extensive and up-to-date information. According to Yusuf Musibau Adeoye et al. (2013), ICT can also be used to do multifaceted tasks, as it provides researchers with a steady path for the dissemination of research reports and findings. Honey and Mandinach (2003), forward-thinking, there are three major reasons for ICT in the education System. They were recommended that it is a tool for addressing challenges in teaching-learning situations; a change agent, and a central force in economic competitiveness. As a change agent, it is accomplished by changing the content, methods, and overall quality and quantity of teaching and learning, thus reducing teachers' workload and confirming an inquiry-oriented classroom environment. Furthermore, ICT is a central power in economic and social changes that requires technology-based skills very sensitive to the future service of today's students. ICT is also important to acknowledge that students are already attentive and engaged in using technology, and creates many remarkable opportunities for schools and teachers to profit from participating in some forms of technology in the classroom environment, and to make the teaching-learning process more effective and enjoyable.

There are many benefits of using ICT in the teaching learning process. Some have been discussed as under:

1. ICT fulfills the needs of individual learner and also helps them in their learning by motivating them to learn, and in this way, they learn better and more effectively.

2. ICT can guide the learner and the teachers by providing them feedback through feedback software, which tells them their mistakes side by side during the learning process.
3. The learning material can be presented more effectively through ICT. And ICT makes the learning material more well-dressed and it increases the interest among the learners.
4. Shifts the emphasis from teaching to learning, thereby creating a more interactive and engaging learning environment for both teachers and students.
5. ICT is flexible and it can be adjusted according to the ages and abilities of the learners and also according to the skills and competence of the educator, which makes the teaching learning process effective.
6. ICT provides an opportunity for educators to develop new ways and methods for making learning more effective, and provides educators with an opportunity to educators to learn new skills and polish their careers.
7. The use of ICT will change the role of the teacher as well as the learner to a great extent. ICT will provide students a wide choice regarding how they approach their study, without the direction of the teacher, and hence minimal teacher management.
8. Through ICT, remoteness never leftovers an issue as the learners and teachers can share their ideas, thoughts, views, and opinions through emails, discussion groups, and chat rooms, etc. Therefore, ICT is not only beneficial to teachers for their own teaching methods and training purposes, but also to use it creatively for accelerating the educational growth and improvement of their students.

7.2.Emergent Methods of ICT Integration in Contemporary Education:

1. **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. According to Tinio (2002) says that, Web-based learning is a subset of E-learning and it refers to learning using an internet browser, such as the model Blackboard or Internet Explorer, etc.
2. **Blended learning:** Refers to learning models that combine the face-to-face classroom practice with e-learning solutions. This type of education in which students learn through both online mode as well as physical modes of teaching. In a true blended learning environment, both the student and the teacher should be physically located in the same space.
3. **Active learning**: - Active learning is an approach to instruction that involves actively engaging students with the course material through discussions, problem solving, case studies, role plays, and other methods. Furthermore, ICT makes the learning environment less abstract and more relevant to their real-life situations. In contrast to memorization-based learning, which is the feature of traditional pedagogy, ICT-enhanced learning promotes increased learner engagement. And ICT improved learning can also be 'just-in-time' learning, where the learners choose what to learn when they need.
4. **Collaborative learning: -** Collaborative learning is generally illustrated when groups of students work together to search for understanding, meaning, and solutions to a specific object or phenomenon. ICT-based learning encourages interaction and cooperation among the students, teachers, and experts irrespective of where they are. Apart from modeling real-world interactions, ICT-supported learning provides an opportunity to work with students from different cultures, thereby helping to enhance learners' teamwork and communication skills as well as their global consciousness. Collaborative models of learning are done throughout the learner's lifetime by expanding the learning pace to include not just peers but also mentors and experts from different kinds of fields.

5. **Creative learning:** Creative learning is not memory-based information. It's building knowledge and developing skills using creative methods. And it's led to increased mastery level potentialities among the learners. Hence, ICT-supported learning ratifies the manipulation of existing information and the formation of real-world products rather than the repetition of received information.
6. **Centralizing learning:** - ICT-enhanced learning promotes a thematic centralizing approach to the teaching and learning process. This approach removes the artificial separation between the different disciplines, theory, and practice, which characterizes the traditional method.
7. **Learning:** - ICT-enhanced learning is student-centered and diagnostic. Unlike rigid, print-based education. And its enhanced learning identifies the presence of different learning paths to explore and discover rather than just listen and recall.
8. **U-Learning:** Ubiquitous learning, also known as U-learning, is based on ubiquitous technology. The most significant role of ubiquitous computing learning in u-learning is to construct a ubiquitous learning environment, which enables anyone to learn at any place at any time. This leads to U – Learning that allows different learning activities surrounded in daily life. Though it is clear that the U-Learning method is due to rapid changes in our learning environment.
9. **Online education**: Due to COVID-19, there is no option without online education. As lockdowns don't allow schools, colleges, so ICT-based education is the only option through which education can be continued.
10. **Platforms for online education**: There are different platforms available for online education. Such as Swayam, Swayam Prabha, MOOC, Webex, Impartus, etc. Through these platforms- online classes, assignments, projects can be taken, videos, charts, images can be uploaded, and recorded audio and videos can be sent to the audience or receivers. So, these platforms are very supportive to the students and teachers respectively in the present education system.

7.3.ICT can be useful for a student in the following ways:

1. ICT enables students can learn from their peers without the assistance of parents and teachers. Hasty availability and being well-equipped with skills and knowledge in using a computer would be very supportive for the students.
2. Through computers, students can get a massive amount of information. Students do not have to depend on books and teachers' class lectures. The information they need is easily accessed through a computer.
3. Since there are videos, images, and other graphs and text found on computers, more students would feel the excitement in studying through the use of gadgets. This motivates students to study.
4. The emergence of online classes opens doors to many students who could not otherwise participate in educational settings due to time and financial limitations. Technology-based courses offer the dropout students a chance to go back to school and improve their survives according to their peace in the field of education.
5. From the way technological advancements are going, it will be obvious that the future will be digital and technology-focused. Well-versed use of technologies will help students in collaborating, communicating, competing, and finding better jobs in the future.
6. The present-day internet enables cooperative learning and creates a more attractive classroom environment. For example, a LISTSERV will allow students to get involved in class discussions through e-mails in a way that is not possible within the four walls of the school classroom.

7. There are many more academic resources on the internet that a college, university, and library can't provide at the same time. Those students who are pursuing higher education can use these resources of internet resources for their research work purposes.
8. The Internet helps students develop their hypertext skills. These types of skills help students to gain knowledge in non-sequential writings.
9. Students can study through online resources and equipment. There are different kinds of resources through which it will be helpful for students to comprehend a specific topic/object. And students can learn from their place at any time, anywhere.
10. Students can meet teachers online and get the required knowledge about the subject. And students can have no limit on time and place.

7.4.ICT can be useful for a teacher in the following ways:

1. ICT facilitates the sharing of resources, expertise, and advice of the teachers/mentors. It enhances the professional growth of the teachers. However, teachers can learn several language skills with the help of ICT.
2. ICT ensures greater flexibility for teachers in carrying out different kinds of tasks on different occasions.
3. ICT promotes the skills, confidence, and enthusiasm of teachers through various teaching techniques.
4. Today, teachers can expand their field of knowledge with the help of the e-learning approach that can be accomplished only through the use of ICT.
5. Through graphics, pictures, and PPT, teachers can present the learning material in more interesting and attractive ways in the teaching-learning process with the help of ICT.
6. By using modern technological devices, teachers can expand their knowledge and develop their professional teaching skills.
7. ICT supports a teacher to learn innovative methods of teaching. He can work with the students on numerous projects, assignments, and research work, etc. And it also helps the teachers in providing syllabi, teaching content, home assignments, etc.
8. It helps teachers to guide their students about the learning resources accessible on the internet, e-books, e-journals, e-magazines, and other social sites linked are helpful in better learning of subject skills and developing their professional skills.
9. The teacher may participate in various in-service training programs and workshops, which are essential for their professional development with the help of ICT.
10. ICT also helps teachers in framing the curriculum of different subjects in the field of education.

7.5.The various ICT initiatives in India:

1. **Digital infrastructure**: There is an essential need to invest in the creation of open, interoperable, evolvable, public digital infrastructure in the education sector that can be used by multiple platforms and fact explanations, to solve for India's scale, diversity, complexity, and device diffusion. This will certify that the technology-based solutions do not become out-of-date with the speedy advances in technology.
2. Various **online teaching platforms and tools**: In the present day, appropriate e-learning platforms such as SWAYAM, DIKSHA will be extended to deliver teachers with well-structured, accessible information that is very friendly, a rich set of assistive tools for monitoring the improvement and progress of learners. These tools, such as two-way video conference and two-way audio interface for holding online classes, are an actual necessity in the present days.

3. **Content creation, digital repository, and dissemination**: A Digital repository of content with creation of projects, coursework, Learning Games & Simulations, Augmented Reality, and Virtual Reality will be established with a clear public system for scores by users on effectiveness and quality. Thus, the enjoyable-based learning and student-appropriate tools such as numerous apps, gamification of Indian art and culture, in multiple languages, with clear operational instructions, will also be formed. After that, a valid and reliable backup mechanism for spreading e-content to students will be provided.
4. **Addressing the digital divide**: Given the fact that there still persists a substantial section of the population whose digital access is highly limited, the existing mass media, such as TV, radio, mobile, computer, and community radio, will be widely used for telecast and broadcasts. Such educational programed will be made available 24/7 in different languages to cater to the varying needs of the student population. Therefore, a special focus on content in all Indian languages will be stressed and required, and digital content will need to be spread among the teachers and students in their medium of teaching as far as possible.
5. **Virtual Labs:** The Present e-learning platforms like DIKSHA, SWAYAM, and SWAYAMPRABHA will also be advancing to make virtual labs so that each students have equal access to quality-based, practical information and hands-on experiment-based learning skills, etc. The possibility of providing adequate access to Socio-Economically-Disadvantaged Groups (SEDGs) students and teachers through suitable digital devices, such as handheld notepads, tablets with pre-loaded content, will be considered and developed.
6. **Training and incentives for teachers**: Teachers are enduring rigorous training in student-centric pedagogy and on how to become high-quality online content creators themselves using online teaching platforms as well as tools. And it will be highly emphasized on the teacher's role in enabling energetic student engagement with the content and with each other, respectively.
7. **Online assessment and examinations**: Appropriate bodies, such as the proposed National Assessment Centre or PARAKH, School Boards, NTA, and other identified bodies, will design and implement assessment frameworks encompassing a strategy of proficiencies, portfolio, rubrics, and standardized assessment tools for the progress of learners in an academic setting. And will be assumed to pilot new ways of assessment or evaluation using education technologies concentrating on 21st century skills.
8. **Blended models of learning**: While promoting digital learning and education, the importance of face-to-face in-person learning is fully recognized. Hence, the numerous effective models of blended learning will be recognized for appropriate replication for different subjects in the field of education.
9. **e-pathshala:** In the present era Digital India movement has promoted extensive use of ICTs in the teaching-learning process and other organizational sectors. Nowadays, e-Pathshala is a combined initiative of the Ministry of Education, Govt of India. And National Council of Educational Research and Training (NCERT) has been established for showcasing and circulating all educational e-resources, including content, textbooks, audio-video, and a variety of printed or non-printed materials for Students-Teachers, Parents, educators, and researchers. Hence, it provides access to digital-based textbooks, supportive materials for all classes, and it allows participation in various exhibitions, contests, workshops, national and international seminars, etc.
10. **NROER:** The National Repository of Open Educational Resources (NROER) is established by CIET and NCERT. It was launched during the National Conference on ICT for School Education in India. It hosted a huge number of educational resources in several subjects and in different forms of Indian

languages for Primary, Secondary, and Senior Secondary classes as well. The resources are accessible in different formats such as Video, Audio, Image, Document, and Collaborating. In the present day, separate from this, all NCERT books are available in flip-book format. So, NROER is a helpful platform and is expected to reach the unreached and institutions like SCERT, SIERT, SIE, Vigyan Prasar, and CCERT, etc.

7.6. Some statistical results on ICT integration and enhancement in Teaching- Learning Process in the contemporary education system:

Global ICT integration in education is on the rise, as the UNESCO report indicates, with some countries having over half of their teachers using digital resources regularly.

- **Access to technology:** A study by the National Center for Education Statistics (NCES) in the USA found that, according to the most recent data, 94% of public-school teachers have access to computers for instructional purposes, illustrating extensive use.
- **Impact on Student Learning:** ICT integration can improve student learning outcomes, particularly in subjects such as mathematics and language skills, according to the World Bank.
- **Use of Learning Management Systems (LMS):** In recent times, there has been a great increase in the usage of LMS. One example is Canvas, whose usage increased by thirty percent during the COVID-19 period, indicating its importance in supporting remote and hybrid learning environments.
- **Digital Literacy and Skills Development:** 90% of jobs in the future will require digital skills according to The European Commission study, thus underlining the significance of teaching ICT skills towards preparing learners for employability purposes.
- **E-learning Growth:** In the year 2019, global e-learning had a $200 billion market, and it is expected to expand significantly over the next decade for the increasing demand for online educational tools and platforms
- **Mobile Technology in Education:** Mobile technology has also revolutionized how education is delivered. In many developing countries, mobile devices are often used as a primary gateway to access educational content, which serves to expand educational opportunities.

This is what the factual information and figures on ICT integration and its impact on education in India look like:

Digital Literacy and Internet Access: Interestingly, recently, about 624 million individuals in India have become users of the internet, making India the second largest online market globally; increased penetration of the internet has had a great effect on access to digital educational resources as well as online learning platforms.

Government Initiatives and Digital Education Platforms: The SWAYAM platform, which was launched by the Government of India, offers more than 2000 courses across various subjects for over 1.5 million students, while Diksha, another initiative, provides digital content for teachers and students, with over 80 million users accessing educational materials.

Mobile Technology Acceptance: It is estimated that more than 1.2 billion people use mobile phones in India, with a larger number of them using smartphones. The extensive usage of mobile technology has significantly contributed to the accessibility of digital learning resources and educational applications, particularly in remote areas.

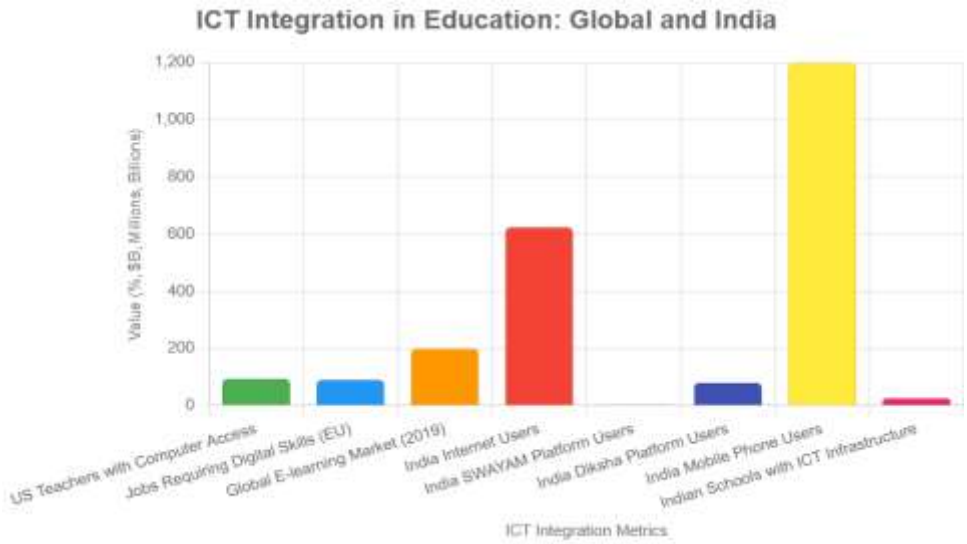
Impact on Learning Outcomes: Research conducted by the World Bank showed that schools in India using digital tools had better student engagement and learning outcomes. Therefore, digital platforms have

enabled more personalized learning experiences and interactive content delivery, thus enhancing educational efficacy.

E-learning Growth during Pandemic: The pandemic period witnessed a significant rise in online education in India, where platforms like BYJU'S reported a high number of users. This era fast-tracked the adoption of digital learning solutions, highlighting their relevance during crisis periods.

ICT Infrastructure in Schools: 25 % of the Indian schools are estimated to have ICT infrastructures like computers and internet connectivity.

Here is a bar graph representing key data points on ICT integration in education, combining global and India-specific statistics from the provided information:



(Fig.1.): ICT Integration Metrics

This chart visualizes:

- 94% of US public-school teachers with computer access.
- 90% of jobs require digital skills (EU).
- $200 billion global e-learning market as of 2019.
- 624 million internet users in India.
- 1.5 million users on India's SWAYAM platform.
- 80 million users on India's Diksha platform.
- 1.2 billion mobile phone users in India.
- 25% of Indian schools have with ICT infrastructure.

Note: The values are in different units (% for percentages, $B for billions of dollars, M for millions, B for billions), as indicated on the y-axis.

8. LIMITATIONS OF ICT USE IN THE EDUCATION SYSTEM:

ICT, as a modern technology that simplifies and facilitates human activities, is not only advantageous in many respects, but also has many limitations. Many conditions can be considered limitations of ICT use in the education system. The limitations can be considered as teacher-related, student-related, and technology-related. All of them potentially limit the benefits of ICT to education. Hence, Teachers' attitude plays a significant role in the teaching-learning process that uses computers and internet connectivity.

There are many drawbacks of using ICT in the education sector, some of them are:

1. There are several misleading and misguiding unauthenticated data which the learners can come across and get confused about.
2. Managing courses online becomes difficult for learners.
3. As India is still a developing nation, the availability of appropriate devices and internet connections is still a problem in several areas.
4. There could be a large misuse of data from the student's end.
5. There is a great risk of cyberattacks and hacks.
6. There has to be a large amount of capital infusion at the beginning of ICT inclusion in the education process.
7. The teachers need to be well-trained and informed about the usage of ICT, which can be a problem sometimes.
8. ICT requires a lot of capital for installation as well as maintenance purposes. Similarly, the device's success in ICT is very expensive.

Though teachers' attitudes towards the use of these technologies are vital and very sensitive. Numerous observations reveal that teachers do not have clearness about how far technology can be beneficial for the facilitation and enhancement of the teaching-learning process.

9. CONCLUSIONS:

The speedy growth in ICT has brought remarkable changes in the 21st century, as well as effective adoption and integration by teachers in the teaching-learning process. The active integration of technology into classroom practices poses a very challenging to teachers and other personnel. The results of this study indicate that teachers, administrators, and educational planners have a strong desire for the integration and adaptation of ICT into education, but they met many barriers to it. Therefore, have implications for training teachers to develop regular users of ICT, concentrating on gaining basic ICT skills. For effective integration of ICT into the teaching-learning process, it can be concluded that the factors that positively influenced teachers, students, and other personnel to use ICT in education. ICT competence, computer self-efficacy, teaching experience, education level, professional development, accessibility, technical support, leadership support, pressure to use technology, government policy on ICT literacy, and technological characteristics. The presence of all aspects increases the probability of excellent integration of ICT in the teaching-learning process. Thus, the training of teachers in pedagogical issues should be improved if teachers are to be influenced by the value of using ICT in their teaching-learning process.

10. CHALLENGES AND OPPORTUNITIES:

However, difficulties like the limitation of the infrastructure, the digital divide, and the different degrees of digital competence are still in place. Solving these issues creates more prospects for improvement and cooperative work regarding ICT implementation in education.

Though teachers' attitudes towards the use of these technologies are vital and very sensitive. Numerous observations reveal that teachers do not have clearness about how far technology can be beneficial for the facilitation and enhancement of the teaching-learning process.

11. RECOMMENDATION:

The following key points may be considered as recommendations for the development of ICT-determined

education in India. These are-

1. Satisfactory funding is required for tertiary education in general and the development of ICT in particular. To this end, the government should increase funding for the entire educational sector.
2. In addition to improved funding by the government and revenue generation drives by individual institutions, the government needs to implement policies that will draw the private sector into ICT development.
3. There should be frequent workshops and training programs to train the teaching and non-teaching staff of higher learning institutions in order to make them competent to handle and operate the ICT infrastructure and services.
4. There should be clear-cut instructions from the concerned authority regarding the validity and recognition of online degree courses being offered by institutions across India.
5. Government should work collaboratively with the private sector and other societies to ensure affordable and sustainable access to ICT infrastructure for enhancing our whole education system.

REFERENCES:

1. **Adesote, S. A., & Fatoki, O. R. (2013).** The role of ICT in the teaching and learning of history in the 21st century. *Educational Research and Reviews,* 8(21), 2155-2159.
2. **Amutha, D. (2020).** The Role and Impact of ICT in Improving the Quality of Education. *Available at SSRN 3585228,* 1-6.
3. **Basri, W. S., Alandejani, J. A., & Almadani, F. M. (2018).** ICT adoption impact on students' academic performance: Evidence from Saudi universities. *Education Research International*, *2018*.
4. **Bhat, T. H., Nazir, A., & Khan, A. A. (2018).** Impact of ICT in higher education: opportunities and challenges. *International Journal of Advance Research in Science and Engineering*, *7*(4), 1503-1509.
5. **Bhasin, B. (2012).** Integration of information and communication technology in enhancing teaching and learning. *Contemporary educational technology*, *3*(2), 130-140.
6. **Bhattacharjee, B., & Deb, K. (2016).** Role of ICT in 21st-century teacher education. *International Journal of Education and Information Studies*, *6*(1), 1-6.
7. **Buabeng-Andoh, C. (2012).** Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using ICT*, *8*(1).
8. **Budhwar, K. (2017).** The role of technology in education. *International Journal of Engineering Applied Sciences and Technology,* 2(8), 55-57.
9. **Bhakta, K., & Dutta, N. (2016).** Impact of information technology on teaching-learning process. *International Research Journal of Interdisciplinary & Multidisciplinary Studies (IRJIMS)*, 7969(131), 131-138.
10. **Dube, B. A., Nhamo, E., & Magonde, S. (2018).** Factors affecting ICT integration in the teaching and learning of physical education in South Africa: A case of Johannesburg East cluster primary schools in the Gauteng Province. *International Journal of Sport, Exercise and Health Research*, *2*(1), 88-92.
11. **Das, K. (2019).** The role and impact of ICT in improving the quality of education: An overview. *International Journal of Innovative Studies in Sociology and Humanities*, *4*(6), 97-103.

12. **Guma, A., Faruque, A. H., & Khushi, M. (2013).** The role of ICT to make teaching-learning effective in higher institutions of learning in Uganda. *International Journal of Innovative Research in Science, Engineering and Technology,* 2(8), 1461-1473.
13. **Ghavifekr, S., Razak, A. Z. A., Ghani, M. F. A., Ran, N. Y., Meixi, Y., & Tengyue, Z. (2014).** ICT integration in education: Incorporation for teaching & learning improvement. *Malaysian Online Journal of Educational Technology*, *2*(2), 24-45.
14. **Ghavifekr, S., & Rosdy, W. A. W. (2015).** Teaching and learning with technology: Effectiveness of ICT integration in schools. *International journal of research in education and science*, *1*(2), 175-191.
15. **Habib, H. (2017).** Role of ICT in Higher Education. *International Journal of Creative Research Thoughts (IJCRT),* 5(4), 2810-2813.
16. **Kler, S. (2014).** ICT integration in teaching and learning: Empowerment of education with technology. *Issues and Ideas in Education,* 2(2), 255-271.
17. **Kaur, S. (2017).** ICT Integrated Education: Shifting role of teachers. *Scholarly Research Journal for Humanity Science & English Language,* 4(23), 6034-6042.
18. **Mbodila, M., Jones, T., & Muhandji, K. (2013).** Integration of ICT in education: Key challenges. *Scholarly Journal of Mathematics and Computer Science*, 2(5), 54-60, 2013.
19. **Mikre, F. (2011).** The roles of information communication technologies in education: Review article with emphasis to the computer and internet. *Ethiopian Journal of Education and Sciences*, *6*(2), 109-126.
20. **Nwigbo, S., & Madhu, B. K. (2016).** Impact of ICT on the Teaching and Learning Process. *IOSR Journal of Mobile Computing & Application (IOSR-JMCA),* 3(2), 1-7.
21. **Oni, N. O., Raji, M. T., Olayiwola, M. A., Adeniran, P. O., & Fasasi, S. K. (2013).** The impacts of information and communication technology (ICT) on the teaching and learning science and mathematics for sustainable development. *Journal of Computer Engineering,* 12(1), 1-3.
22. **Olaore, I. B. (2014).** The impacts (positive and negative) of ICT on education in Nigeria. *Developing Country Studies*, *4*(23), 154-156.
23. **Pheeraphan, N. (2013).** Enhancement of the 21st century skills for Thai higher education by integration of ICT in classroom. *Procedia-Social and Behavioural Sciences,* 103, 365-373.
24. **Pandey, A., & Pandey, A. K. (2020).** ICT in teaching and learning: An Indian scene. *Journal of Critical Reviews*, *7*(9), 861-865.
25. **Pavel, A. P., Fruth, A., & Neacsu, M. N. (2015).** ICT and e-learning–catalysts for innovation and quality in higher education. *Procedia economics and finance*, *23*, 704-711.
26. **Savov, T., Terzieva, V., Todorova, K., & Kademova-Katzarova, P. (2017).** Contemporary technology support for education. *In CBU International Conference Proceedings,* Vol.5, 802-806.
27. **Saxena, N. (2017).** The role and impact of ICT in improving the quality of education: an overview. *International journal of engineering sciences & research technology,* 6(3), 501-503.
28. **Sharma, A., Gandhar, K., Sharma, S., & Seema, S. (2011).** Role of ICT in the Process of Teaching and Learning. *Journal of Education and Practice,* 2(5), 1-6.
29. **Saravanakumar, A. R. (2018).** Role of ICT on enhancing quality of education. *International Journal of Innovative Science and Research Technology*, *3*(12), 717-719.
30. **Sangrà, A., & González-Sanmamed, M. (2010).** The role of information and communication technologies in improving teaching and learning processes in primary and secondary schools. *Australasian Journal of Educational Technology*, *26*(8).

31. **Sarkar, S. (2012).** The role of information and communication technology (ICT) in higher education for the 21st century. *Science*, *1*(1), 30-41.
32. **Siddiquah, A., & Salim, Z. (2017).** The ICT facilities, skills, usage, and the problems faced by the students of higher education. *EURASIA Journal of Mathematics, Science and Technology Education*, *13*(8), 4987-4994.