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"Teaching Effectiveness using ICT Tools in the Classroom Environment: A Review for its Optimal Use in the Indian Educational System''

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Abstract

This study provides a comprehensive overview of the use of ICT tools and their impact on teaching effectiveness within the Indian education system. The study employs a narrative review research methodology. This review includes research articles published in international journals related to the Indian education system. The author's perspectives and conclusions are analysed through this research. The findings of the study clearly indicate that ICT-based teaching is more effective than traditional teaching and highlight how the use of ICT resources is being promoted in the school education environment**.**

Keywords: Indian Education System, ICT, Teaching & Learning, Teaching Effectiveness, Motivation.

Introduction

"Technology will never replace great teachers but in the hands of great teachers, its transformational''- *(George Couros).*

Education is the fundamental right of humans. The imagination of life is not possible without education. "Education is the manifestation of the perfection already in men"- (Mahatma Gandhi) and "Education is the process of living through a continuous reconstruction of experience"- (John Dewey). A child starts up his primary education with his family and mother is a first teacher of a child and after a decided age a child start up his formal education with his teacher. "The future of the nation is built in the classroom of a school"- (APJ Abdul Kalam). A teacher Play an important role in build the future of the country. The role of a teacher is not only to teach in the classroom of the student but also to create skilled citizen to contribute in the development of the country. So effective teaching is essential in the classroom. A teacher adds more efforts in teaching process to student learning. Effective teaching is a plan teaching process that decided in the pre-active phase of teaching. A teacher can use projected and non-projected teaching aids in teaching process to make effective it. Non-projected teaching aids is a traditional or regular aid according teaching needs but use of projected teaching aids in the classroom have started to 20th century to till the current time is link to the 21st century which is full of technology. In 21st century development of computer and internet technology have developed a new branch of technology that called ICT (Information and Communication Technology). In present situation ICT also, a branch of teaching technology. Technology is an art of do any work and use of technology in teaching to improve student learning called as teaching technology. A teacher can make teaching more effective with use of ICT and to use of ICT a teacher needs for computerised devices and resources. Via Use of ICT a teacher can develop interest in the student and improve learning. The main objective of teaching is student learning. If learner not grow that wise teaching was not effective. At present the uses of ICT in teaching grow learning. Information and Communications Technology (ICT) refers to the integration of audio-visual broadcasting, telecommunication systems, and computer networks (Chan & Holosko,2016, Watling & Rogers, 2012). Use of technology in elementary education also is offering per caption into the educational growing and development. Implementation of educational technology in primary level improves fundamental learning in students (Boateng, Penu, Boateng, Budu, Marfo & Asamoah, 2024). The traditional classroom used non-projected teaching aids for student learning and their engagement whereas technology assisted learning tools such as mobile, moocs, O.H.P. (Over Head Projector), L.C.D., smartboard, audio-video recorder etc. the students engagement is more than in digital classroom then other (Haleem, Javaid, Qadri, & Suman, 2022). Information and communication technology are rapidly growing in the teaching and learning field and teachers should professionally developed himself to catch up as the rapid evolution of technology to make an effective teaching and learning environment in the classroom. A teacher is a role model for all

students. A good teacher encourages the students every time to achieve their goals. A trusty bond of between student and teacher also creates a creative & perfect learning environment. A digital classroom is also helpful for distance and virtual learning (Andrew,2024). Use of ICT and integration of technology in education refers to computer-based communication into daily classrooms in the process of instructions. Integration of technology in education fully changed the classroom environment and replaced the traditional approach in the classroom. In the present scenario an ICT full fill classroom has many computerised devices (Ghavifekr & Rosdy, 2015).

India has the largest and ancient educational system in the world. The formal education in India depends on the traditional model and has many deficiencies in educational culture like curriculum base learning, rot learning, high cost of education, teacher quality, resources and facilities etc. India's educational system was reformed by the Indian government. The Indian government committed various commissions and organisations that make many policies to try their best to grow the Indian educational system. NCTE and NCERT is an autonomous organisation of the Indian government. NCTE (development,1995) is working for teacher education and NCERT (development,1961) is working on quality-based education that also includes curriculum and technology-based learning and focus on developed ICT infrastructure in Indian schools (George, Johnson & Reddy, 2021). In Indian schools, the use of computers in 2004 for intermediate classes and after that ICT grew in Indian school system to make effective teaching and learning process.

Best ICT tools for teaching and learning process in the classroom

Teaching with an ICT tools plays a key role in the teaching learning process in the classroom. In education information and communication technology (ICT) tools are digital and computer-based resources that make teaching more interactive and effective. There are given below in table-1, some examples for ICT tools that use in the classroom-

(**Table-1)**

ICT tools for teaching and learning process

Type of ICT Tool	Devices/Platform	Use in Education
Hardware Tools	Computers, Tablets, LCD, O.H.P., Smartboards etc.	digital lessons, enable e-learning etc.
Software Tools	Google Classroom, Moodle, Canvas	Manage classes, assignments, and course content etc.
Communication Tools	Zoom, Microsoft Teams, Google Meet, LMS	Conduct online classes and virtual discussions.
Collaboration Tools	Kahoot, Padlet, Miro	Interactive quizzes, group projects, brainstorming.
Subject-Specific Tools	Geo Gerba, Duolingo, Ph.ET. Simulations	Support maths and science learning

ICT based infrastructure is very helpful to the effective teaching and learning process and also helpful to achieve educational goals for students and teachers. ICT infrastructure included are smart teaching with computerised devices, electronic collections, data storage and presenting information etc (Sharma & Mishra,2015).

Objectives

To find out the teaching effectiveness with use of information and communication technology (ICT) in Indian classroom system and find the scope of further research.

Research Methodology

This research paper focuses on the use of ICT approaches in teaching and learning within the Indian education system and their impact on teaching effectiveness. The objective is to enhance teaching effectiveness by utilizing ICT resources in school classrooms. This study employs a **Narrative Review** methodology, incorporating qualitative data. The review examines the technological approach, teaching effectiveness, and presents comprehensive conclusions. The research also includes articles published in leading journals related to ICT & teaching effectiveness.

Relevant studies published for this review paper between 2012 and 2024 were identified through various databases, ResearchGate, Google Scholar, PubMed, Science direct and Scopus Indexed Journals etc. This review study is comprised 30 research & review articles that published in international journals which had impact and substantial contribution.

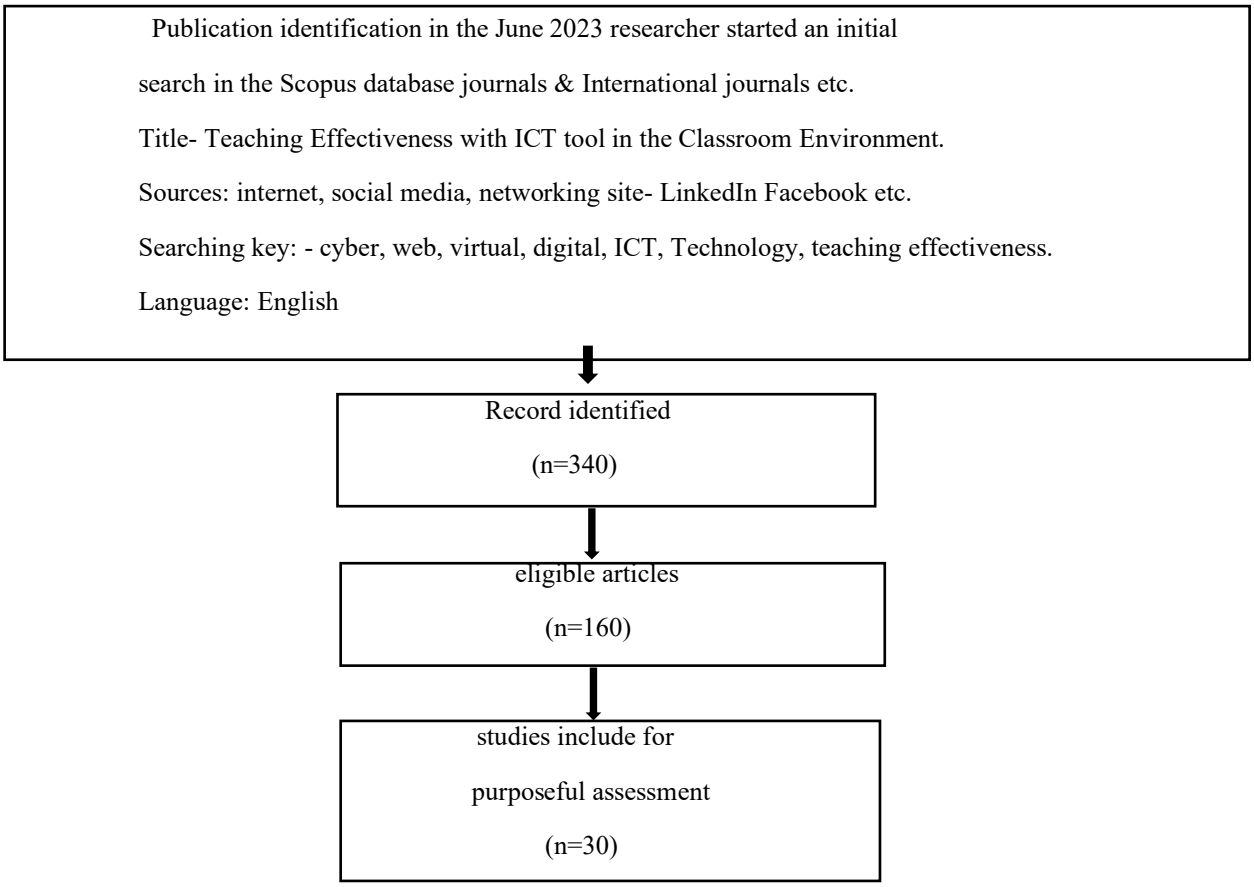

Figure-1; Flow chart: Searching of studies

Review of Literature

1. **(Curie, 2024)** has studied on "Integration of ICT in Higher Education in India – Teacher Preparedness". According author the objectives of the National Education Policy (NEP-2020), education in Higher Education Institutions (HEIs) has been transformed through digitalization, where online platforms are being used in a phased manner to promote teaching and learning. The use of ICT has fostered blended learning. The digitalization of education has provided students and teachers with new opportunities for skill development. In higher education, it is essential to equip schools in both rural and urban areas with robust ICT infrastructure. In the future, it is crucial to provide ICT training to socially, economically, geographically, and physically disadvantaged groups so that the Indian population can utilize ICT to increase productivity and creativity, rather than becoming slaves to the technology.
2. **(Das, & Singh, 2024)** has conducted a study on "Transformations in Education: A Comprehensive Review of ICT Adoption by Indian Secondary School Teachers". In this study, the researcher analysed research papers written by various authors from different regions of India. The analysis revealed that the use of ICT is crucial for Indian education and will contribute to the progress of the Indian education system, but the use of ICT resources is fraught with challenges. The biggest challenge in using technology is the lack of trained teachers, and there are also some technology-related problems. Rural areas lag behind urban areas in the use of technology; therefore, there is a need to focus on rural education in the Indian education sector, and emphasis should be placed on the integration of ICT resources in both rural and urban schools. The use of ICT resources in teaching and learning enhances the effectiveness of education.
3. **(Kumar, & Choudhary, 2024)** the study has based on "The Role of Information and Communication Technology in Education: Opportunities and Challenges". The study revealed that the use and integration of ICT

in education can bring about a revolutionary transformation in the teaching and learning process. However, the use of ICT in the classroom may also present some challenges, such as dependence on technology, concerns about data privacy, and the digital divide. Transparent and equitable teaching methods should be employed when using ICT to address these challenges. The use of ICT has also played a significant role in bridging the gap between research and practice. ICT has promoted personalized learning. Teachers can use ICT resources to monitor student's learning progress in the classroom. Through the use of ICT, the objectives initially set for teaching and learning can be easily achieved, and students can be provided with quality education.

4. **(Phuong, Pham Van, Phuong, Van, Thu, Phuoc & Huu, 2024)** the study has examined on the subject "ICT integration for pre-service teachers: A Scopus-based bibliometric review (1997–2024)". In this article, the author studied 415 research papers to understand the role and importance of ICT integration. The study aims to provide information on the integration of ICT for pre-service teachers and the importance of training provided in relation to ICT. According to the author, the use of ICT in the field of education is most prevalent in countries like Australia, Turkey, and Spain. ICT is also useful in the field of research. Three trends have been considered crucial regarding ICT integration and training for pre-service teachers: the use of ICT in educational institutions under the impact of COVID-19, ICT integration models for professional development in teacher training, and developing and evaluating an understanding of digital transformation in ICT integration among pre-service teachers at the university level. The research shows how ICT played a significant role in the field of teaching and learning during recent pandemics, for which it is essential that teachers are trained. Therefore, if pre-service teachers are trained in ICT from the beginning, the use of ICT will accelerate in the future, and quality education can be provided.
5. **(Agarwal, 2024)** has studied on "Reflection of Pre-Service Teachers on usage of Information and Communication Technology during the School Internship of Bachelor of Education Programme". The study revealed that during the school internship program as part of teacher training, no gender-based differences were found between male and female pre-service teachers. The use of ICT resources does not discriminate between male and female teachers, thus providing equal opportunities to both. Through the use of ICT resources, teachers and students can enhance their knowledge. During the internship experience, pre-service teachers promote socialization, encourage teaching-learning concepts, develop innovative thinking, and are motivated for continuous learning and practice. The inclusion of the internship program in the two-year B.Ed. program has been appreciated.
6. **(Binu, Mol T. V. 2024)** has focused on "ICT Tools and Resources-A Study of Higher Education in India" via an article. The Indian education system has undergone changes from time to time. Change is necessary because it is change that transforms society. Changes made to the curriculum help in developing students' skills. Furthermore, teaching delivered through ICT resources, instead of traditional methods, provides students with empowering knowledge, allowing them to access education anytime, anywhere. Acknowledging the challenges posed by ICT-based learning and AI, greater emphasis is being placed on virtual learning environments. Useful AI tools have been developed for teachers, and the use of these AI tools in conjunction with ICT resources is making the teaching-learning process more effective and of higher quality. In the future, it is essential that the entire field of education, including the teaching-learning process, be centred around AI.
7. **(Misra & Sabharwal, 2024)** has presented a report on "India Higher Education Report: Technology and Higher Education". This study focuses on the digitalization of higher education in India and the role of AI in online learning. The study highlights the necessity of adopting emerging digital technologies in university-level education due to the shift from offline to online learning during the COVID-19 pandemic. According to the study's findings, there has been an increase in the use of technology in India, leading to improved student learning and communication. The technological infrastructure of education at the university level can be further enhanced, and seminars and workshops are being conducted through online learning platforms. The digitalization of education in India has also fostered the growth of AI technology. AI technology has facilitated personalized learning, resulting in improved learning outcomes. Through AI technology, students can access content tailored to their specific needs. The study concludes that changes in traditional teaching processes and the effective implementation of policies, while considering local needs, will make the use of technology in higher education essential for achieving quality education and will help India become globally competitive.
8. **(Ngcapu, Simelane, & Mji, 2024)** has conducted a study on "Aligning preservice teachers' experiences for ICT integration in education in the school of education at the University of Technology in South Africa" The objective of this study was to examine the integration of technology in coursework among pre-service teachers and the field workers. The study found that some ICT resources such as podiums, data projectors, cameras, and display screens were available in the lecture halls, while trace of digital technology in other classrooms there was no any

ICT resources available. In fact, some schools even lacked basic electricity. Interactions with pre-service teachers revealed that only the instructors were able to utilize the ICT resources, leaving the student teachers deprived of their use and unable to gain sufficient knowledge about them. In other words, they were unable to properly understand and utilize ICT resources without hands-on experience. Some pre-service teachers even stated that they had no computer knowledge whatsoever, making the study of ICT resources without prior computer training meaningless for them. Therefore, the study concluded that basic computer literacy is essential for both teachers and students to effectively utilize ICT resources. For this reason, computer education should be introduced from the primary grades onwards; otherwise, students in higher grades will need to receive separate computer training.

9. **(Nongbri, 2024)** has studied on "Factors Influencing the Use of ICT in the Indian Education System". The article indicates that the disparity in ICT usage is found more in teacher circumstances than in educational levels. Information and communication technology (ICT) are useful in both primary and higher education; that is, ICT can be used in large classes for group teaching, in smaller classes for tutorials, in individual study, and in distance learning systems. The accessibility of ICT has also led to advancements in the field of information and communication technology itself. Sending pictures and documents, preparing and distributing data and teaching materials to various locations, and accessing digital libraries have all become possible through ICT. ICT-based education helps in educating the new generation, instilling in them values, beliefs, ethics, and professional qualities. However, the use of ICT in classrooms in India has not yet been fully implemented. This means that Indian schools not only need improvements in resources and infrastructure, but it is also crucial to train and prepare teachers and students in the effective use of ICT.
10. **(Zehra, & Singh, 2024)** has conducted a study on "Revolution in the Indian education system from traditional to digital transformation in higher education". The aim of this study was to conduct a survey among pre-service teachers to evaluate their attitudes towards ICT. The study highlighted how traditional classroom-based teaching in India is currently undergoing a rapid technological transformation, meaning that conventional teaching is being enhanced with the help of ICT-based resources. ICT has played a significant role in the shift towards modern teaching methods. The study concluded that providing ICT training to pre-service teachers can lead to a substantial improvement in teaching effectiveness and pedagogical skills.
11. **(Lahiani, Aljarrah, Alqudah, & Alwaely, 2023)** has studied on "Teachers' Perspectives on ICT Curriculum and Students' Learning Skills". The study revealed that teachers, whether male or female, can effectively utilize ICT to provide quality education to students if they possess a positive attitude and are given opportunities for continuous professional development. This includes providing them with opportunities to deliver lessons through mediums such as audio and video recordings, making resources available, promoting collaborative use of ICT across different parts of the country, and granting teachers autonomy in their teaching methods. The study also observed that computer-trained teachers are more successful in using ICT than untrained teachers. Therefore, it is crucial to provide computer training to teachers before promoting the use of ICT in education.
12. **(Yanuarto, Maat, Setyanigsih, Isnawan & Zakaria, 2023)** has studied on "The moderating model of teaching anxiety on teaching beliefs and TPACK effect to ICT literacy among pre-service mathematics teachers". The objective of this study was to determine how ICT can reduce anxiety associated with teaching and assist in providing training to teachers through teacher training programs. The study placed particular emphasis on the use of ICT in mathematics education. The findings revealed that the use of ICT allows for the implementation of various teaching methods in mathematics, which are more suitable for secondary school students. Therefore, the integration of ICT into the mathematics curriculum, along with technological knowledge, makes mathematics teaching more engaging. However, there has been no significant increase in ICT literacy, which is a matter of concern for India and requires decisive action. The government needs to pay more attention to teacher training in ICT, and further research should be conducted on this topic in the future.
13. **(Haleem, Javaid, Qadri, & Suman, 2022)** has studied on "Understanding the role of digital technologies in education: A review**".** The study states that digital classroom technology refers to various software and tools designed to support the teaching and learning process. Students are being taught to use technology as a strategic tool. The use of technology in education helps students become lifelong learners by providing them with independent access to digital knowledge. With the help of technological tools, students learn at a faster pace and can also monitor their own learning progress. In the future, technology in education will be implemented even more successfully so that students can improve their performance in a digital learning environment. Besides educating students in the classroom, technology also assists them in making informed decisions in areas such as climate change, air and water security, biodiversity conservation, and disaster resilience. The study concludes that the use of technology in education, while considering natural resources, also promotes educational, economic, and social development.

14. **(Chawla, 2021)** has conducted a study on "A Study of Positive Impact of ICT in Higher Education in Uttar Pradesh: Opportunities and Challenges". The objective of this study was to examine the challenges currently faced in the use of ICT in secondary schools in Uttar Pradesh. Indian schools have witnessed a rapid increase in the use of ICT resources to enhance the quality of education in their institutions. However, the integration and use of ICT in Indian schools face numerous obstacles. Addressing the barriers related to ICT-based education at the secondary level is crucial for the effective development and implementation of ICT, thereby eliminating these obstacles. Appropriate suggestions are needed to improve the teaching-learning process in the field of ICT, so that teachers and learners can utilize ICT effectively and enhance the quality of education.
15. **(George, Johnson & Reddy,2021)** has studied on "The Role of ICT in Teaching and Learning with Special Reference to Indian Education System: - A Narrative Review of the Literature". The aim of this research is to explore new avenues for the use and impact of ICT in teaching and learning within the Indian education system. This research paper identifies improvements in various methodologies related to the use of ICT in the context of the Indian education system. The study reveals that ICT tools are being used by teachers and students for faster learning and teaching, especially during the COVID-19 pandemic, when the use of ICT tools increased rapidly, and mobile and laptop applications became more popular among students and teachers. The use of ICT resources is making the teaching-learning process simpler and more effective. However, the study also found that the use of ICT tools is more prevalent in urban areas compared to rural areas, primarily due to limited access to technology in villages. The study further indicates that the adoption of ICT tools in India is slower compared to other countries.
16. **(Sharma, 2021)** has presented a report on "Impact of ICT on Teaching Practices in India". The report suggests that the use of ICT resources in Indian school classrooms is proving helpful in enhancing teachers' effectiveness. ICT resources facilitate the adoption of innovative teaching methods. Some students are using educational technology for learning, and others are exploring its potential for improving academic outcomes. Rapid technological advancements have compelled teachers to adopt innovative approaches in their teaching methods. The use of technology in education is transforming the teacher's role from that of an instructor to a facilitator, meaning students are using e-learning tools under the guidance of teachers, who act as mentors. ICT resources and the use of technology in education are making students' learning journeys easier and have proven helpful in making teacher's instruction more effective.
17. **(Gizaw & Tessema, 2020)** has presented a review of research on "Role of information and communication technologies in educational systems: a systematic review". The purpose of this study was to investigate the impact of the integration of Information and Communication Technology (ICT) on teaching and learning. The use of ICT in education has led to improved teaching quality through enhanced teaching methods, and ICT has contributed to positive changes in the management of educational systems. ICT is a flexible technology that allows students to learn according to their own time and geographical constraints. However, existing challenges such as a lack of technological knowledge and a shortage of trained teachers are affecting the use of ICT and hindering its effective implementation. Therefore, it is crucial to train teachers and students in a way that enables them to easily utilize ICT in teaching and learning activities, allowing students to acquire more knowledge in less time and effectively meet the challenges of the 21st century.
18. **(Tamulee,2020)** The study has examined on the subject "Reviewing the Revised ICT @ School policy in India: Attended Consequence of Educational Eco-system". The article highlights the complexities affecting the governance structure and schools where private companies, school administration, subject teachers, and ICT teachers intend to work together, yet each entity appears to operate independently based on its own principles, leading to a fragmented situation characterized by mutual blame. The revised ICT@ school plan incorporated privatization and New Public Management (NPM) into the education sector to improve efficiency in ICT use in schools and ensure accountability. The Ministry of Human Resource Development continued to implement New Public Management (NPM) in areas such as education services, the midday meal program, and teacher training, and promoted ICT. A balance needs to be struck in the relationship between school management and teachers, incorporating the use of ICT resources, curriculum development, and ICT training. The author said that, in line with the times, appropriate pathways and context-specific partnerships for governance and implementation should be developed for the integration of ICT into the Indian education system to make teaching and learning more effective.
19. **(Phutela & Dwivedi, 2019)** has conducted a study on "Impact of ICT in education: student's perspective". The study revealed that in an emerging country like India, there is a particular need for ICT support to develop E-learning materials. The use of E-learning and ICT in Indian schools is a novel concept that holds immense potential for the future. The Indian education system is undergoing a paradigm shift with the increased use of

ICT. The challenges associated with implementing ICT make this path difficult, but by dispelling misconceptions and encouraging the fearless use of technology, it is possible to overcome these obstacles and challenges. The complete integration of ICT in India is a long-term policy that will require time to gain full acceptance. In the future, E-learning could become the most effective teaching method, transforming the landscape of Indian education.

20. **(Pathak, & Vyas, 2019)** has planned a study on "E-Learning in Modern Digital Environment: A Pragmatic Perspective of Education". The author said, the modern era is an era of technology, in which e-learning and ICT are the latest forms of technology. E-learning and ICT are being used in school education and self-learning to make teaching and learning more effective. With the help of e-learning tools, students sitting in every corner of the country are able to receive education. ICT-based teaching and learning is not limited to school education; rather, students can continue learning at any time of the day using e-learning tools. This article discusses the advantages and disadvantages of ICT resources and the future of e-learning. It also examines how e-learning has transformed educational content in India and what the future transformed form of e-learning will be like in the overall education system, giving rise to new opportunities for research.
21. **(Singhavi & Basargear, 2019)** has conducted a study on "Barriers Perceived by Teachers for use of Information and Communication Technology in the classroom in Maharashtra". The analysis of the study revealed that private and English-medium schools show a greater willingness to implement ICT resources, while regional schools show comparatively less interest. School inspections revealed a lack of internet connectivity in schools. While computers are available, they are not being used for teaching and learning activities due to a shortage of educational software. In some cases, teachers lack the necessary computer skills, and in others, there is a lack of appropriate educational models. Providing training to teachers before implementing ICT resources is crucial. The use of ICT resources is time-consuming; therefore, adjustments to the school timetable are necessary, subject by subject. The benefits of ICT should be clearly explained, and the limitations of the exam-oriented curriculum should be addressed so that students focus on learning rather than rote memorization.
22. **(Kundu, 2018)** has make a case study on "A Study on Indian Teachers' Roles and Willingness to Accept Educational Technology". The author found in the study that both the teacher's role and their computer proficiency are crucial aspects of the digitalization of education. It is essential for teachers to be able to use computerized devices in the digital classroom. Therefore, computer literacy should be made a vital part of teacher training. This will ensure that traditional teaching methods gradually become obsolete, and every teacher will be able to teach effectively in a digital classroom. Developing an innovative environment alongside educational innovation is extremely important. The transformation of the educational structure should support the integration of technology and teacher collaboration to effectively enhance the learning process.
23. **(Kaur & Singh, 2018)** conducted a study on **"**Teacher's attitude and beliefs towards use of ICT in teaching and learning: Perspectives from India". The study found that information and communication technology (ICT) is being used as a transformative tool in the field of education, providing an opportunity to improve the quality of education and rethink educational systems. The use of ICT tools in the classroom for teaching depends on the attitudes and beliefs of the teachers. The study revealed that the use of ICT is currently limited, but there is no significant difference in the use of ICT resources based on gender. The major problems faced by teachers in Indian schools are weak infrastructure, lack of technical support, and a lack of computer literacy. These factors contribute to the limited use of ICT. Enhancing teacher effectiveness through the use of ICT resources in teaching and learning depends on the teacher's attitude and competence. Therefore, before promoting ICT resources in the field of education, it is crucial to provide teachers with training on how to use ICT resources effectively so that they can utilize them appropriately and improve the teaching process.
24. **(Kundu,2018**) has studied on "Prospects of ICT Integration in School Education: An Analytical Study of the Government Schools in West Bengal, India". This research paper highlights the role of ICT in enhancing the quality of education among secondary level students in West Bengal, a state in India. The use of ICT at the secondary level provides opportunities for effective communication between teachers and students that would be unimaginable without it. However, some challenges may arise during the implementation of ICT, so identifying these obstacles and challenges is crucial to finding solutions if any difficulties arise during the study. Important suggestions should be provided to address the obstacles and challenges encountered during implementation, ensuring that educational objectives are achieved without compromising teaching and learning in the classroom. In these schools in the Bengal region, ICT is being used very effectively, allowing for easy control of potential obstacles and negative factors, and ultimately providing students with quality education.
25. **(Roy & Paul, 2017)** conducted a study on "Integrating ICT in Indian Education System: An Overview of New National Education Policy-2016". The study said that the first National Education Policy in India was developed

in 1986 to improve the Indian education system. It was later revised in 1992, leading to numerous reforms in the education sector. However, the Indian government, in light of various development schemes such as Swachh Bharat Abhiyan, Digital India, Skill India, made in India, and Smart Cities, deemed it necessary to further modify the education policy. Through the National Education Policy 2016, several essential changes were introduced in the education sector. Currently, circumstances are changing rapidly; new technologies, new subjects, and new methods of acquiring relevant knowledge are emerging daily. Information is spreading widely on social media. In such a system, it is crucial for the education system to keep pace with the times, and developing a strategy for this is a key initiative of the Indian government. Focusing solely on equality and access is insufficient. The current need is to work on improving the quality of education. The education policy suggested that ICT (Information and Communication Technology) should be made an integral part of school education and also utilized in teacher training colleges. Students should be encouraged to engage in self-study using ICT resources. In 1947, India's literacy rate was recorded at 12%, which rose to 74% in the 2011 census, with a significant improvement in girls' participation. However, the issue of the quality of education remains a challenging one. Digitizing current education has become extremely important. Teacher vacancies in government schools, teacher absenteeism, and student dropouts also remain problematic issues. India is rapidly advancing technologically, and in the coming years, every city and village in India will be digitally connected, which will be immensely beneficial to the education sector. Therefore, the use of ICT has been deemed essential. Attention has been focused on the new education policy because improving the quality of education, building trust, ensuring transparent management, and utilizing ICT are crucial. The use of ICT is vital to make teaching and learning more meaningful; therefore, ICT should be implemented in schools and also incorporated into teacher training programs.

26. **(SR, & kumar, 2017)** has conducted a study on "ICT in Teaching Learning Process for Higher Education: Challenges and Opportunities". Technology based learning is highly effective in making higher education high-quality, but in modern times, it faces several challenges. Therefore, this study examines the challenges and opportunities related to ICT in education. The study indicates that ICT resources and technology-based learning promote effective learning habits, allowing individuals to concentrate better and learn faster. However, ICT resources are not being made available in sufficient quantities in schools, preventing many teachers from utilizing them in their teaching. Therefore, management should focus on ensuring the availability of ICT resources so that all teachers can use them to provide effective instruction to students. Management must also address obstacles to the use of ICT resources, such as power outages and internet connectivity issues, to prevent disruptions in classroom activities and ensure continuous learning for students.
27. **(Jha & Shenoy, 2016)** conducted a study on the topic "digitization of Indian education Process – A hope or Hype". Through this study, it we observed that the Indian education system, which began with the guru-shishya (teacher-disciple) tradition, has now evolved to include digital classrooms, where students receive online and offline education using digital tools. The Indian education system has made significant efforts to adapt to the changing landscape of education, particularly in the trend of digitalization. With the help of digital resources, students can now access online books, study online, and participate in virtual group discussions, there by developing their learning skills. The study also discusses various areas that can improve the future of education, such as E-learning and cloud computing tools. While the digitalization of Indian education has yielded numerous benefits, some important goals remain unfulfilled. The focus should not solely be on prioritizing technology, but rather on empowering students by enabling them to effectively utilize technology. The author suggests that a hybrid model, combining the physical presence of teachers with technology, should be adopted in the education sector to make the teaching-learning process more effective.
28. **(Pandey, 2015)** has studied on "ICT and Quality Education in Indian Schools". The author believes that the role of ICT in education is crucial. Ignoring it or lagging behind in the field of ICT poses a significant challenge to education. Schools equipped with ICT resources motivate students to learn more effectively, while the knowledge imparted in schools lacking ICT resources is less impactful. The use of ICT is essential for achieving educational objectives. It has also been observed that while the availability of ICT resources in schools is increasing, their utilization has not kept pace due to a lack of teacher training. Therefore, it is crucial to train teachers in ICT to foster innovation. This article demonstrates that developing a positive attitude towards ICT is not solely the responsibility of teachers or school management, but rather a responsibility that must be shared by every member of society. A positive societal attitude towards technological education will accelerate the use of ICT resources. Therefore, developing a new mindset towards ICT among parents and society is also essential for the effective use of ICT in education.
29. **(Juliet, 2014)** has studied on "The Barriers of using Education Technology for Optimizing the Educational Experience of Learners". The aim of the study was to investigate how technical education is shaping the future

and what challenges are being faced in the path of technical education. Indeed, the present era is the age of technology, and all activities have become institutionalized around technical education; therefore, there is no turning back. Many challenges are encountered in the use of technology, but these challenges cannot deter teachers and learners from utilizing technical education. Technical education is proving helpful in providing quality education by positively impacting teaching and learning objectives. The use of technology in education is for the purpose of learning, not merely for the sake of using technology itself.

30. **(Capan, 2012)** has organised a study on "Teacher Attitudes towards Computer Use in EFL Classrooms". The aim of this study was to investigate the attitudes of EFL (English as a Foreign Language) teachers towards computers. Language teachers believe that teaching and learning any language is easier with the help of ICT resources, and that students are more capable of learning a language joyfully through audio and video recordings. All the teachers showed a positive attitude towards ICT, but they need to be trained in using ICT resources for language teaching. Teachers who have access to computers at home and at school were found to be more proficient in computer training and the use of ICT resources. Therefore, providing computer training to teachers is essential to make language teaching more effective.

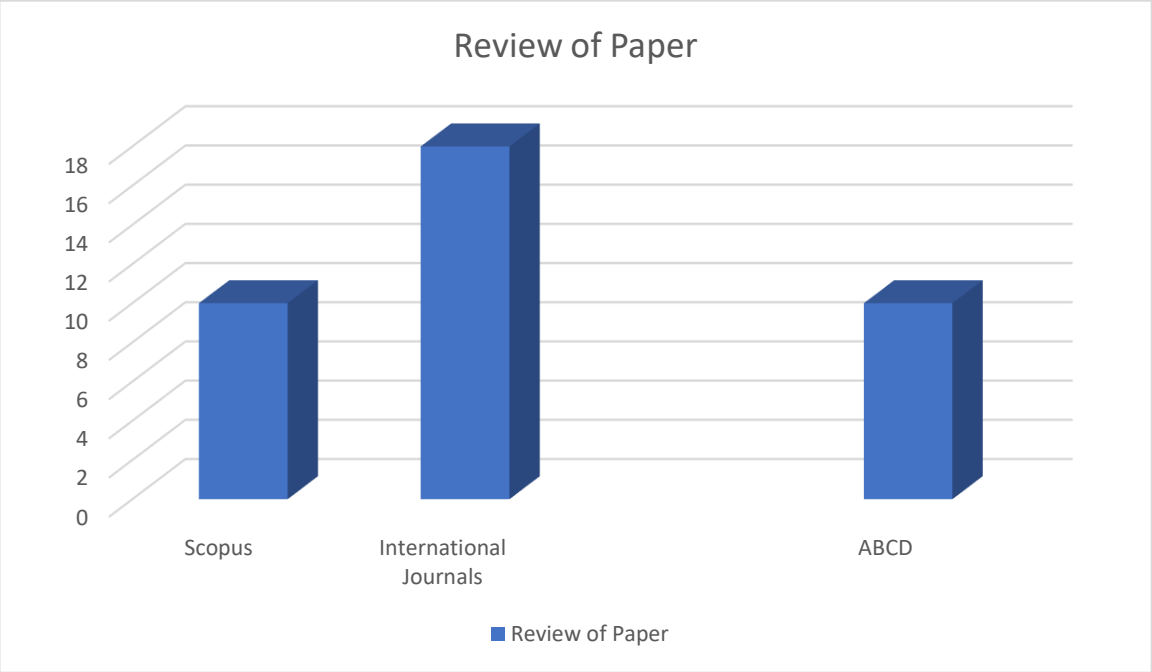

Figure-2; Meta-Data

This research paper includes 10 SCOPUS indexed journals, 18 review articles from international journal and 10 from other journals includes research gate. Thus, a total of 38 research papers were included in the preparation of this paper.

Result & Discussions

Based on past research and surveys, it is evident that the technologizing of education is making both teachers and students more skilled. The presence and use of ICT resources in Indian school classrooms are enhancing the effectiveness of teaching. With the help of ICT resources and learning apps, students are becoming more motivated to learn independently. ICT-based teaching has been found to be more effective than traditional teaching, and an increase in student learning has been observed. The use of ICT resources in the classroom has led to the development of innovative teaching methods, which are making learning simpler and more accessible. Technology-based education is considered to be of higher quality, while traditional teaching is less impactful. Teachers are playing the role of guides for students in the use of ICT resources. Some studies, while praising ICT-based teaching, have also described the obstacles encountered in its implementation. It is crucial that teachers receive computer-based training for the effective use of ICT resources, and school management also needs to take specific steps regarding the ICT system. Studies conducted in the past have also revealed that schools in rural areas are still lagging behind in technological education, even though a technology-based education system provides equal opportunities and does not involve gender discrimination. The use of ICT resources in language teaching is more effective

compared to other subjects because students can learn the nuances of language more easily through audio and video recordings.

It is clear, therefore, that teaching delivered through ICT resources is more effective in skill acquisition. Teachers in school education should be encouraged to use ICT resources. Teachers need to be knowledgeable about various educational apps so that they can provide appropriate guidance to students for self-learning. While using ICT resources may require more time initially, students learn in less time, and the main objective of any teaching is student learning. Teachers should necessarily use ICT-based resources in subjects where teaching can be made more engaging through their use. In lower grades, where language learning begins, the use of ICT resources should be made mandatory. The Government of India must also implement programs to bring schools in rural areas up to par in terms of ICT so that no school lags behind technologically. The recommendations regarding ICT given in the New Education Policy (2020) must be implemented in every educational learning sector. ICT training should be included in teacher training programs so that the future teachers of the country are equipped with technological skills and can contribute positively to the teaching-learning process and thus support the development of the country.

(Table-2)

Summary of Evaluation; Use of ICT & Teaching Effectiveness

S. No.	No. of Research	Research Area	Discussions
1	1,6,7,14,26	ICT in the Higher Education System,	ICT increases productivity and creativity in higher education system, ICT improves teaching effectiveness, ICT change traditional method of teaching.
2	3,8,9,10,13, 17,22	Role of ICT in education for teaching and learning purpose,	Use of ICT comes learning progress, the use of ICT includes basic literacy for teachers and students, use of ICT is low in Indian education system compared to other countries, need a hybrid model, education structure can support integration of Technology, useful in language learning via audio visual aids provide quality-based education.
3	2,4,5,27	ICT integration in teaching and teacher training program,	Teachers trained in advance for use of ICT tool, included internship B.Ed. program has appreciated, use of ICT make easy teaching and learning journey.
4	11	Use of ICT teacher's perspectives,	Computer trained teacher more successful than other.
5	12	Teaching an anxiety regarding ICT,	The government pay more attention to teachers training with ICT.
6	15,16,19,23, 24,28,30	Use of ICT student's perspective,	ICT provides E-Learning material to students, motivate to self-learning, learning process is very easy with ICT tool.
7	20	E-learning,	Student continue E-Learning with more ICT tools.
8	21,29	Barriers in use of ICT,	Use of ICT depend on resources, time taken process and expended, have more technical issues.
9	18,25	National Education Policy 1986-2020.	ICT integration an innovation and A responsible organisation NCERT working for it.

In above-mentioned table after a proper review of 30 articles makes a report that presented how many research papers analysed about research area and authors discussion with their result.

Conclusion

Based on the present study, it can be concluded that ICT resource-based teaching is more effective than traditional teaching. However, technology in Indian education has not yet progressed as much as expected. Keeping in mind India's sustainable development goals, emphasis is being placed on technology-based education and the integration of ICT resources in Indian schools. Teachers need to be made aware of the importance of ICT resources so that they can understand the role of ICT in effective teaching and learning, and its use in the teaching-learning process can be accelerated. Considering the demands of the modern era and the younger generation, a change in teaching methodology is necessary, and it is crucial for teachers to acquire the skills to use ICT resources. The government and school management need to formulate necessary policies for the use of ICT resources so that no school remains untouched by the ICT system. The use of ICT resources is motivating students to learn more in less time and to engage in self-study. The use of ICT resources in school education is proving helpful in giving shape to the dream of Digital India. Given the demand for the use of ICT resources to enhance the effectiveness of teaching, training and internship programs related to ICT resources have been included in teacher training programs. Due to technological advancements, the trend of self-study is motivating students towards progress. Students, who are the future of the country, are progressing on the path of development due to innovations in education, which in turn is contributing to the progress of the nation.

Future Scope

Based on previous studies, it has been found that further research is needed regarding the use and role of ICT resources in making teaching more effective. Some important topics for future research are described below:

(1) The availability of ICT resources in educational institutions based on modern technology.
(2) The computer proficiency of teachers working in schools; and the organization of workshops for teachers on ICT-related skill development.
(3) Special programs and schemes by the Government of India and school management for the use of ICT resources in backward areas.
(4) Mandatory use of government-run educational channels by every school for teaching and learning purposes
(5) Generating experimental feedback and fostering innovation among teachers and students regarding the use of ICT resources in teaching and learning.

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