International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Integrating Information and Communication Technology in Teacher Education: Its Role and Impact

.

Sayantani Saha[1], Risa Das[2], Binayak Dey[3]

[1] Post Graduate Student (ODL), University of Kalyani
[2]Post Graduate Student (ODL), University of Kalyani
[3]Coordinator, IQAC, University of Kalyani

Abstract
Continuous professional development to integrate ICTs into teaching and learning is essential as the educational curriculum is evolving every day. Despite many teachers lacking prior training in utilizing digital technologies, it is important to equip them with the necessary knowledge and skills. The Teacher education institutions play a crucial role in integration of ICT competencies. Teachers need technical support to effectively use and maintain technology in their instructional practices. Like other countries Indian educators are also embracing innovative approaches to teach through ICT tools, utilize digital platforms for lesson planning, deliver them in the classroom setup, and assessment. Well-prepared teachers with ICT skills are pivotal for successful technology-based education. The Government of India has consistently promoted policies to encourage technology-driven innovations in education and encourage ICT integration among educators. This research explores the integration of ICT into teacher education programs highlighting the importance of training educators to effectively use technology for better teaching and learning. Synthesizing the literature, empirical studies and the articles, this review inspects pedagogical strategies, challenges, and opportunities associated with ICT integration in teacher education. Additionally, it explores the impact of ICT on teacher preparation, professional development, and classroom practices. For the purpose of the study, the data was collected from various journals, internet, books, records, etc. This article aims to help the policymakers, teachers, and researchers to create good plans for integrating technology into teacher training. This way, we can make sure that teachers are well-prepared to meet the demands of modern classrooms.

Keywords: Information and Communication Technology, Teacher Education, Teaching Practices.

Introduction

The integration of ICT in teacher education offers a transformative potential, enabling educators to adapt to the demands of the digital era. Teachers are at the heart of any living society. The global resource has transformed into a knowledge-based resource because of ICT which is considered a powerful educational resource for improving quality education. With a plethora of digital tools and resources available, teacher training programs can harness ICT to enrich pedagogical approaches, foster collaboration, and communication, and nurture digital literacy among prospective educators. The incorporation of technology into the teaching and learning process creates a sense of completeness,

allowing for seamless integration. In the pedagogical realm, the utilization of technology signifies integration, moving beyond mere information retrieval towards problem-solving, facilitating novel instructional and learning experiences, promoting deep engagement with ideas, enhancing student interaction with the subject matter, fostering enthusiasm for teaching and learning among faculty and students, and optimizing classroom interaction. Educational technology recognized the importance of Teacher Training Institutes, the crucial role of teachers, skill development and use in different spheres of Teacher Education. Technology literacy is the easiest way to ensure that early programming, Internet usage and the application of tools 2.0 such as instant messaging, wikis, blogs, online discussions or tweets appear in today's classrooms. As we have seen the Covid 19 period has given greater recognition to the use of technology in most educational settings. Computer mainframes have been used in education since the early days of this technology in educational institutions and throughout the early development of computers to replicate real-life communication skills of the 21st century. The solution to the increasingly complex nature of schools is gradually challenging traditional views on teaching. Teacher educators have recognized that the inclusion of information and communication technologies as a teaching skill seems bound to be one of the appropriate answers for this role because they offer the opportunity to continuously innovate materials and methods and allow to improve innovative and quality learning in the classroom. Network structure calls for self-organizing principles and a renewed teacher capable of adapting to multifaceted situations and making quick decisions in uncertain situations. In this context, a narrative literature review of ICT in teacher education has been discussed in this article.

Theoretical Framework

This research paper is an attempt at thematic research based on secondary data, sourced from journals, articles, review papers and SWAYAM platforms. ICT provides educators with the tools to tailor personalized learning experiences to the unique needs of each student and enhance knowledge retention, while also improving transparency in attendance and grading processes that facilitate communication between teachers, students, and parents. Policymakers recognize that ICT in education can help students compete in the global economy and become part of a skilled workforce facilitate social mobility through various technologies in ICT including-access to course materials via remote devices; online digital repository for lecture, course materials and digital libraries; online based academic management system; employing the flipped classroom concept; using handheld computers, tablet computers, audio players, projector devices etc. Also, the growing number of Massive Open Online Courses (MOOCs) platform like Coursera, Khan Academy and Edx tell us that there is a huge demand for learning facilities outside the classroom. Improving education quality through efficient technology is important. Increasingly, institutions seek ICT accreditation for high-quality, future-proof education. This concept prioritizes learning over teaching, fostering a more engaging environment for teachers and students.

Teacher training, as a professional development, is a product of many interacting imperatives, government policies, agendas, institutions, and organizations; and benchmarks of teaching accreditation actions. The current curriculum of ICT in education is a step that deserves to be realized. The UGC panels on teacher education and NCTE have also suggested suitable reforms from time to time. UNESCO has developed the ICT competency framework for teachers as a tool to guide in-service teacher training in the use of ICT in the education system. The framework addresses recent technological and educational developments in the ICT field. Teaching e-content by all states in all regional languages

as well as by NCERT, CIET, and CBSE will continue to address the digital divide with populations whose digital access is extremely limited.

Objectives of the study

This study has two key purposes. The first is sought to assess the ICT competencies of teachers in preparation for teaching and knowledge through ICT. The second objective is to outline a program of professional development for teachers necessary to teaching practices with the use of specific ICT gadgetsand understand how to integrate it into the curriculum successfully.

Methodology

The present study follows in general the method of thematic research. This is non-experimental research and as such, there is no possibility of control or manipulation of variables in the experimental sense. All evidence has been scrutinized by the process of criticism both internal and external. External criticism related to determining the authenticity, validity, trustworthiness of the source or historical data has been conducted. In the present study the data used are mostly in the nature of written materials. Internal Criticism, which is about ascertaining the reliability or truthfulness of the information within the source, is also complete. All sources used in the research study have been scrutinized both externally and internally wherever applicable.

Integration of ICT in Teacher Education

Access to a diverse range of learning materials: ICT offers plenty of resources to enhance the teaching skills and learning abilities. IT provides a plethora of resources to increase teaching methodologies and improve learning outcomes. The integration of audiovisual education has become an ideal process of teaching learning. The availability of these resources continually expands. Specifically, they are encouraged to be attached to multimedia technologies for expressing ideas, presenting projects, and organizing information, thereby enriching their educational experiences.

Enhanced teaching practices: ICT empowers teachers by providing them with a diversity of multimedia resources, including videos, animations, and graphics, which they often utilize to illustrate complex concepts and ideas in a visually compelling manner. ICT offers interactive platforms and collaborative tools which encourage critical thinking and peer learning among students, promoting a collaborative learning environment. Moreover, the integration of ICT allows teachers to provide instruction according to the individual needs and preferences of each student. Furthermore, the adding of gamification elements, such as educational games and quizzes, serves to increase student engagement and motivation in the learning process. Lastly, the implementation of the flipped classroom model increases class time for interactive learning activities, discussions, and problem-solving, ultimately leading to enhancement of student engagement, motivation, and academic achievement.

Collaborative learning: Nowadays, ICT facilitates collaborative studying and teaching, allowing individuals to work together in groups or in clusters, regardless of geographical limitations. With the help of the internet people can unite remotely to accomplish any task efficiently. Different technologies such as postal systems, telephone, mobile and computer-based recording and playback systems contribute to educational broadcasting in the modern era making learning materials more accessible and interactive. Although the internet and its websites are well-known to many children in developed countries and educational elites worldwide, they sometimes remain inaccessible to a significant portion

of the population who lack access to these resources due to socio-economic disparities. This digital divide highlights the ongoing challenge of ensuring non-discriminatory access to technology and educational opportunities for all individuals, particularly those who lack even the most basic resources for subsistence. Closing this gap is essential for fostering inclusive.

Multimedia approach to education: Audio-visual education is a comprehensive approach to educational practices, involving careful planning, thorough preparation, and the effective utilization of various devices and materials that engage both sight and sound for educational purposes. These tools include a wide range of resources such as still and motion pictures, filmstrips, television, transparencies, audiotapes, records, teaching machines, computers, and video discs. The evolution of audio-visual education has closely shown the advancements in technology and learning theories, reflecting a dynamic interaction between pedagogy and technological innovation. Studies in Psychology highlight numerous advantages associated with the integration of audio-visual elements into educational settings. All learning is based on perception, the fundamental process through which sensory inputs are gathered from the environment. The higher processes of memory and concept formation cannot happen without prior perception. Normal human beings can attend to only a limited amount of information at a time; their selection and perception of information is influenced by past experiences. Furthermore, the organization of educational material in a logical and accessible manner that is recognized as a key determinant of learning outcomes, facilitating comprehension and knowledge retention. Thus, Audio-visual education uses perception, thinking, and teaching methods to make learning better and more meaningful.

Updated information: The internet is like a big web of connected computers which are following the same rules. There is an endless amount of information and data that we can access easily. This information is being updated continuously so these sources are trustworthy. Butit is important to be careful because not everything on the internet is true. We should always check whether the information is reliable before using it. So, while the internet has a ton of useful stuff, it is smart to double-check and make sure that we are getting the right information for what we need.

Distance learning: ICT plays a vital role in distance learning, enabling remote communication, collaboration, and access to resources. This includes online platforms for various courses and interactions, video conferencing, both synchronous and asynchronous modes, access to diverse educational resources, remote assessment and feedback mechanisms, mobile learning, adaptive learning tools, and professional development opportunities for instructors. Overall, ICT facilitates effective teaching and learning experiences, transcending barriers of time and space in distance education. The term "distance learning" emerged during a revolution in communication technologies, replacing various terms like home study, independent study, and correspondence study. This shift has been promoted by the increasing demand for educational access and the utilization of innovative communication tools, despite criticisms regarding its efficacy compared to traditional learning. However, the reduced costs per student and the convenience of studying from home have served as compelling incentives for learners and educational institutions.

ICT Competencies for Professional Development and Knowledge Building

To enhance teacher education and ensure it aligns with the needs of contemporary society, it is essential to embrace innovative approaches that utilize modern methodologies and technologies. Here are some detailed suggestions for the new approaches in teacher education:

Research and Experiments: Encouraging teachers to integrate research and experiments into their teaching so that can foster a more engaging and dynamic learning environment. By this approach, teachers can cultivate critical thinking. Students will be encouraged to question, investigate, and draw conclusions based on evidence, promoting their critical thinking and analytical skills.

Application of Inquiry-Based Learning: Teachers can guide students through the scientific inquiry process, helping them to develop a profound knowledge of the subject matter.

Hands-On Experience: Experiments and research projects provide practical learning experiences, making abstract concepts more tangible and understandable.

Project-Based Learning (PBL): Project-based learning involves students working on a project over an extended period, which helps them gain knowledge and skills by investigating and responding to complex questions or challenges.

Utilizing Information and Communication Technology (ICT): The integration of ICT into teaching methods can create a more personalized and effective learning experience. The key strategies include adaptive learning technologies. These tools adjust the difficulty of tasks based on the individual student performance by providing personalized support and challenges.Digital tools like simulations, educational games, and multimedia make the learning more interactive and engaging.There are platforms like Google Classroom or Microsoft Teams which facilitate communication and collaboration between students and teachers, both inside and outside the classroom.

Data-Driven Instruction: Teachers can use data from different educational software to track student progress and tailor instructions to meet the individual needs.

Access to Resources: Students have access to a huge quantity of online resources, including videos, articles, and interactive modules, which can enhance their understanding of any topics.

Flexible Learning Environments: Technology enables flexible learning methods like blended and flipped classroom models, where students can learn at their own pace and revisit material as needed.

Findings and Discussion

The use of ICT in teaching has enabled teachers to create a better learning environment for students, making it easy for them to grasp complex concepts and ideas. The use of technology during teaching calls for a transition period that may instill resistance to change among the teachers and learners. The use of technology may require a shift from traditional teaching methods, and this can be a difficult process, especially if the teaching staff is not well-versed in the use of technology. It involves developing effective strategies for locating appropriate digital content, following guidelines for e-safety, evaluating the potential effectiveness and appropriacy of digital content, tools and platform for achieving desired learning outcomes, using technology in the production of teaching and learning. The assessment of ICT capability is crucial, as this will let you track progress and plan adequately for students to meet their capabilities. They promote the development of higher order thinking skills as children are able to make decisions based on the opportunities, limitations of the systems available, literacy integration, building on experiences from home and stimulating and structuring activities.

Recommendations and Suggestions

ICTs have had a positive impact on educational practices and will continue to have a positive impact in the future. This merging of ICTs will transform several educational practices, bringing terrific impact on the teaching-learning process, the accessibility of education, the motivation of learners, the congenial

learning environment, and the academic performance of students. Technology has a big impact on the delivery of lessons or even education. It also increases flexibility, so that students can access learning regardless of time and geographical constraints. It also creates a rich learning environment, which provides new opportunities for teachers and students. Such opportunities can have a major impact on students' academic performance and educational attainment. Similarly, the wider availability of good education practices and educational programs that can be disseminated through ICT will help to spread the best education system. Creating time to spend as a family doing physical activities are a great way to reduce screen time and increase physical health outcomes.

These recommendations provide students and educators some guidance as to how they can mentally and physically feel better about bringing technology into their classrooms and lives. Being knowledgeable of the negative effects that technology can have on mental health, physical health, and student learning, is the first step towards developing healthy and intentional technology use habits. It would provide a rich environment and motivation for the teaching-learning process which seems to have a profound impact on the process of learning in education by offering new possibilities for learners and teachers. Similarly, the wider availability of best practices and best course material in education, which can be shared using ICT, can foster better teaching and learning.

Conclusion

In conclusion, Information and Communication Technology (ICT) plays a great role and an essential tool for improving the quality of education. Teachers most often use ICTs for 'routine tasks' (record keeping, lesson plan development, information presentation, basic information searches on the Internet). Teachers more knowledgeable in ICTs use computer assisted instruction less than other teachers who use ICTs, but utilize ICTs more overall. ICT allows people from different parts of the world to communicate and connect, improving communication opportunities and the ability to meet new people and form friendships online.

This study was conducted to narrative literature review studies on integrating information and communication technology in teacher education. This study followed journals, articles, review papers and SWAYAM platforms as the framework. In this analysis, two objectives on ICT integration in teacher education were explored with regard to benefits, challenges, best practices, and barriers. As this thematic review highlights, several types and characteristics of ICT tools and methods can be utilized in teaching various teacher education topics. For adequate and appropriate ICT integration resources, infrastructure, and technical assistance, policymakers should develop and implement clear, coherent, and comprehensive policies and guidelines. To foster a supportive, collaborative, and innovative school climate, teachers must be able to participate in practical and meaningful professional development opportunities. For Information and Communication Technology to be effectively utilized for teaching and learning, practitioners must adopt, adapt, or innovate pedagogical approaches, integrate ICT tools with curriculum objectives.

References

1. Ana-Belén Sánchez-García, Juan-José Mena Marcos, He GuanLin and Joaquín Pinto Escribano. (n.d.). Teacher Development and ICT: The Effectiveness of a Training Program for In-Service School Teachers. Procedia - Social and Behavioral Sciences 92 (2013) 529 – 534.

2. Binayak Dey and Binoy Roy. (2019). Impact of Information and Communication Technology in Teacher Education. ASIAN JOURNAL OF EDUCATIONAL RESEARCH & TECHNOLOGY, 9(2).
3. C. Usharani Dr. K. Nachimuthu. (2020). THE ROLE OF ICT IN TEACHER EDUCATION. EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal, 6.
4. Chakrabarty, D. P. (2020). Pedagogical Integration and Innovation of ICT in the Teacher Education Program. International Journal of Science and Research (IJSR), 9(6).
5. Chandan Singhavi and Prema Basargekar. (n.d.). Barriers Perceived by Teachers for use of Information and Communication Technology (ICT) in the Classroom in Maharashtra, India. International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2019, Vol. 15, Issue 2, pp. 62-78.
6. Chatterjee, M. (April 17, 2021). Importance of ICT in Education and Teaching-Learning process. https://monichatterjee.medium.com/importance-of-ict-in-education-and-teaching-learning-process-f794225c1c2e
7. Dodmani, S. B. (2019). Role of ICT in 21st Century's Teacher Education. International Journal of Science and Research (IJSR), 8 (2).
8. Dr. SUNILKUMAR B. DODMANI Faculty in K.U.C.E, D. (2020). ICT INTEGRATION IN TEACHER EDUCATION. International Journal of Creative Research Thoughts (IJCRT) www.ijcrt.org, 8(3).
9. Granberg, C. (2011). ICT and learning in teacher the social construction of pedagogical ICT. Department of Applied Education/Interactive Media and Learning, ISBN: 978-91-7459-212-2 ISSN: 1650-8858.
10. Jayson A. Dela Fuente1 and Leomar C. Biñas. (2020). Teachers' Competence in Information and Communications Technology (ICT) as an Educational Tool in Teaching: An Empirical Analysis for Program Intervention. Journal of Research in Education, Science and Technology, 61-76.
11. Juanjo Mena,Balwant Singh and Anthony Clarke. (2018). Teacher education for ICT integration in classroom. Conference: The Sixth International Conference.
12. Kidega Charles, George Awila, Moses Kargbo, and Bob Makindu Luyeye. (2024). IMPACT OF ICT ON TEACHING AND LEARNING PROCESS IN SECONDARY SCHOOLS IN UGANDA: LITERATURE REVIEW. International journal and management and commerce innovations, 11(2).
13. Kundu, A. (2018). A Study on Indian Teachers' Roles and Willingness to Accept Educational Technology. International Journal of Innovative Studies in Sociology and Humanities, 3(9).
14. Malik Mubasher Hassan#1 and Tabasum Mirza. (2020). Impact of ICT in changing the role of a teacher: An Overview. GEDRAG & ORGANISATIE REVIEW - ISSN:0921-5077, 33(3).
15. Mandal, J. H. (2018). Role of ICT in Teacher Education Programme. © 2018 JETIR, 5(8).
16. Mohamed Chaib & Ann-Katrin Svensson. (n.d.). ICT in Teacher Education Challenging prospects.
17. Mr. Parmanand Barodiya1, Mr. Saurveer Singh2 and Mrs. Anupam Choudhary3. (2015). Use of ICT in Teacher Education. The International Journal of Indian Psychology, 2(4).
18. Prof. Shyamal Majumdar, P. (n.d.). Emerging Trends in ICT for Education & Training. National Institute of Technical Teachers' Training & Research, Kolkata, India.
19. Samson. R. Victor and Dr. S. Srikanta Swamy. (2011). Present Scenario of ICT In Teacher Education. Indian Journal of Applied Research, 1(2).
20. Sharma, A. (April 2021). Impact of ICT on Teaching Practices in India.

21. Souheyla, B. (2019). Major Barriers and Challenges to Integrating ICT in Education. Cross-Currents: An International Peer-Reviewed Journal on Humanities & Social Sciences, 5(11).
22. Zarabanda, D. E. (2019). ICT and its purpose in the pedagogical practice. Research in social sciences and Technology, 4(2).