International Conference on Latest Trends in Science, Engineering, Management and Humanities (ICLTSEMH -2025)
19th January, 2025, Noida, India.

CERTIFICATE NO : ICLTSEMH /2025/C0125304

Scenario of ICT Integration Towards Secondary Education in India and West Bengal with Special Reference to Teacher Attitudes

Pratap Barman

Research Scholar, Department of Education, Mansarovar Global University, Sehore, M.P., India.

ABSTRACT

The integration of Information and Communication Technology (ICT) has emerged as a transformative force in secondary education, reshaping teaching–learning processes, instructional delivery, and educational administration in India. National initiatives such as Digital India, Samagra Shiksha Abhiyan, ICT@Schools, and DIKSHA have accelerated the adoption of digital tools, smart classrooms, and e-learning platforms across schools. In West Bengal, state-level interventions including Banglar Shiksha Portal, smart classroom projects, and teacher ICT training programs have contributed to expanding digital infrastructure and access at the secondary level. However, the effective utilization of ICT largely depends on teachers' attitudes, competencies, and willingness to integrate technology into classroom practices. In this article, scenario of ict integration towards secondary education in India and West Bengal with special reference to teacher attitudes have been discussed.

Keywords: *ICT, Integration, Secondary Education, India, West Bengal, Teacher Attitudes.*

INTRODUCTION

The rapid advancement of Information and Communication Technology (ICT) has significantly transformed the landscape of education across the world. In the 21st century, ICT has emerged as a powerful tool for enhancing teaching–learning processes by improving access to information, fostering interactive learning environments, and promoting learner-centred pedagogical practices. Recognizing its transformative potential, educational systems globally have increasingly emphasized the integration of ICT at all levels of schooling, particularly at the secondary stage, which serves as a crucial foundation for higher education and skill development (Allen, C, & Berggren, J., 2016).

In the Indian context, ICT integration in secondary education has gained considerable momentum over the past two decades through various policy initiatives and government interventions. Programmes such as ICT@Schools Scheme**,** Digital India**,** SWAYAM**,** DIKSHA**,** National Education Policy (NEP) 2020, and the establishment of smart classrooms have underscored the commitment of the Indian education system towards digital transformation. These initiatives aim to bridge the digital divide, improve educational quality, and equip learners with digital competencies essential for participation in a knowledge-based economy. However, the effective implementation of ICT in schools remains uneven due to infrastructural constraints, regional disparities, and varying levels of teacher preparedness.

IJAMSR

International Conference on Latest Trends in Science, Engineering, Management and Humanities (ICLTSEMH -2025)
19th January, 2025, Noida, India.

West Bengal, as one of India's major states with a diverse socio-economic and educational landscape, presents a unique scenario in terms of ICT integration in secondary education. The state government has introduced several initiatives such as Banglar Shiksha Portal**,** smart classroom projects**,** teacher ICT training programmes, and e-governance in school administration to promote the use of digital technologies in teaching and learning. Despite these efforts, challenges related to availability of digital infrastructure, internet connectivity, continuous professional development, and classroom-level application of ICT persist, particularly in rural and semi-urban areas.

Among the various factors influencing the successful integration of ICT in secondary education, teacher attitudes play a pivotal role. Teachers act as key agents of change, and their perceptions, beliefs, motivation, and readiness towards ICT significantly determine the extent and effectiveness of technology use in classrooms. Positive teacher attitudes facilitate innovative pedagogical practices, while resistance, anxiety, or lack of confidence can hinder meaningful ICT adoption. Therefore, understanding teacher attitudes towards ICT integration becomes essential for assessing the real impact of policy initiatives and technological investments (Zhiwen, H. & McGrath, I., 2011).

In this context, the present study seeks to examine the scenario of ICT integration in secondary education in India and West Bengal with special reference to teacher attitudes. By analysing the existing infrastructure, policy frameworks, and teachers' perceptions and readiness, the study aims to provide insights into the opportunities and challenges of ICT-enabled education. Such an analysis is crucial for informing policymakers, educational administrators, and teacher educators to design effective strategies for strengthening ICT integration and enhancing the quality of secondary education.

IMPORTANCE OF TEACHER ATTITUDES TOWARDS TECHNOLOGY

Educator attitudes about technology significantly influence the efficacy of digital tool integration in the teaching-learning process. The efficacy of technology-based education, despite the availability of technological infrastructure, is predominantly contingent upon instructors' willingness, confidence, and favorable opinion of its application.

Educators with positive dispositions are more inclined to investigate, embrace, and incorporate digital resources such as smart classrooms, e-learning platforms, multimedia content, and online evaluations. Their receptiveness to innovation directly influences the extent and efficacy of ICT implementation in educational institutions (Bevo, W., Chang, C-Y., 2019).

Favorable teacher dispositions enable educators to utilize technology innovatively to improve lesson presentation, student involvement, and classroom dynamics. Educators proficient in technology create more engaging, interactive, and student-focused learning environments.

When educators exhibit passion and confidence in utilizing technology, kids likewise cultivate curiosity and motivation. This results in a deeper comprehension of material, increased engagement, and augmented digital literacy competencies among students.

IJAMSR

International Conference on Latest Trends in Science, Engineering, Management and Humanities (ICLTSEMH -2025)
19th January, 2025, Noida, India.

An optimistic outlook inspires educators to participate in training programs, improve their skills, and stay updated on emerging digital trends. This dedication to ongoing education enhances the overall quality of instruction.

Contemporary curricula increasingly prioritize ICT competencies, integrated learning, and digital pedagogy. Teachers' positive dispositions facilitate the effective execution of these curriculum improvements and bolster the shift towards technology-enhanced education.

Technological transitions frequently induce apprehension or opposition among educators. Educators with optimistic dispositions are more flexible and receptive to change, facilitating schools' effective management of digital transition (Joaquim, G., 2017).

Technology enables educators to accommodate various learners via varied tactics, assistive technologies, and adaptable learning modalities. Educators with optimistic dispositions are more inclined to embrace inclusive methodologies.

A positive perspective enables educators to explore innovative approaches, like flipped classrooms, virtual laboratories, gamification, AI-driven evaluations, and collaborative digital initiatives. The collective views of teachers significantly impact the institution's overall ICT culture. Optimistic dispositions foster collaboration, the exchange of digital resources, and the cultivation of a nurturing digital learning atmosphere.

Educational institutions frequently allocate substantial resources to technology infrastructure. The return on these investments is predominantly contingent upon teachers' willingness and favorable opinions of actual use.

Educator attitudes are essential for the successful integration of technology in education, as they directly affect the extent and efficacy of technology utilization by teachers. Optimistic dispositions facilitate increased technology utilization in educational settings, but negative or apprehensive attitudes engender reluctance and opposition, obstructing the advantages of digital resources for learners (Ouma, G.O., Awuor, F.M. & Kyambo, B., 2013).

A teacher's disposition significantly influences their propensity to utilize technology, frequently surpassing the impact of their genuine convictions on technology's efficacy. A teacher's optimistic disposition towards technology fosters the development of essential ICT (Information and Communication Technology) skills and the confidence to utilize it successfully in their instruction. When educators exhibit enthusiasm for technology, it enriches the student's learning experience, rendering it more engaging and dynamic. The disposition of an educator is a crucial determinant in the degree of technology integration within the instructional framework, ranging from basic presentation tools to sophisticated online learning systems. Educators with optimistic dispositions are more inclined to impart crucial digital citizenship competencies, including the assessment of online content, comprehension of digital footprints, and acknowledgment of technology's effects on the brain (Yeo, M.M.L., 2014).

IJAMSR

International Conference on Latest Trends in Science, Engineering, Management and Humanities (ICLTSEMH -2025)
19th January, 2025, Noida, India.

Educators hesitant to adopt technology may perceive it as disadvantageous for their students or may feel inadequately equipped, resulting in their complete avoidance of its use. An adverse disposition may result in the underutilization or complete neglect of costly technological and software expenditures, thus forfeiting the opportunity for enhanced educational outcomes. Unmotivated teachers are less inclined to pursue or participate in necessary training to attain proficiency in technology, perpetuating a cycle of inadequate abilities and attitudes.

SCENARIO OF ICT INTEGRATION TOWARDS SECONDARY EDUCATION IN INDIA AND WEST BENGAL

Information and Communication Technology (ICT) has progressively emerged as a vital element of India's secondary education framework. In the past two decades, the Government of India has executed many programs to broaden digital access, improve teacher proficiency, and incorporate technology into educational practices. The integration of ICT in secondary education in India and West Bengal presents a dual narrative of advancement and obstacles, characterized by governmental initiatives and digital learning resources, alongside a notable digital divide between urban and rural regions. West Bengal has implemented initiatives such as the "ICT@Schools" scheme and vocational computer training, with certain schools integrating ICT to enhance pedagogy, while national projects like the NME-ICT mission seek to expand access and content. The general situation is improving, with increasing acknowledgment of ICT's capacity to promote engagement and resource access; nonetheless, infrastructure deficiencies, especially in rural regions, continue to pose a substantial obstacle to equitable implementation.

The integration of ICT in secondary education in India and West Bengal demonstrates considerable advancement facilitated by national and state policy initiatives. Effective integration is contingent upon instructor attitudes, digital proficiency, infrastructure availability, and ongoing training. Urban schools exhibit substantial ICT utilization, whereas rural schools, particularly in districts such as Cooch Behar, Jalpaiguri, and Purulia, continue to face challenges related to connectivity, resource accessibility, and teacher preparedness. Enhancing teacher proficiency and guaranteeing equal access are crucial for the effective use of ICT in the secondary school framework.

Indian Context:

The government prioritizes ICT integration via initiatives like the NME-ICT mission, which seeks to close the digital gap by facilitating network access and creating e-content. Information and Communication Technology (ICT) is utilized to foster student-centered and self-directed learning, enhancing lessons with multimedia and interactive information.

Information and Communication Technology (ICT) has progressively emerged as a vital element of India's secondary education system. In the past two decades, the Government of India has executed many programs to broaden digital access, improve teacher proficiency, and incorporate technology into educational practices.

IJAMSR

International Conference on Latest Trends in Science, Engineering, Management and Humanities (ICLTSEMH -2025)
19th January, 2025, Noida, India.

The ICT @ Schools Scheme, initiated in 2004, aims to facilitate computer-assisted education in secondary and higher secondary institutions by establishing computer laboratories, ensuring internet access, and providing digital learning resources. The National Policy on ICT in School Education (2012) underscored digital literacy, ICT-facilitated teaching and learning methodologies, and the ongoing professional development of educators. The Digital India Initiative (2015) is a nationwide effort aimed at digital empowerment, emphasizing broadband connectivity in educational institutions, online resources, and improved digital governance. Digital platforms provide electronic information, open educational resources (OER), and educator training modules to enable technology-enhanced learning. The National Education Policy (NEP) 2020 emphasized the incorporation of digital pedagogy, blended learning, virtual laboratories, and the application of artificial intelligence (AI) techniques for individualized education. Notwithstanding these measures, digital disparities endure, particularly between urban and rural educational institutions. Challenges encompass insufficient infrastructure, restricted teacher training, inconsistent electrical supply, and diminished technological self-efficacy among educators.

West Bengal Context:

The West Bengal government has actively implemented initiatives such as the "ICT@Schools" project, designed to incorporate ICT in secondary and upper secondary educational institutions. The state has commenced programs to develop computer skills within vocational education, emphasizing the provision of practical skills to pupils. Initiatives such as "In Tuition" are supplying online educators for various courses and intend to transmit online science laboratories to students. Research indicates that infrastructure continues to provide a significant problem, particularly in underdeveloped regions, hindering the effective and equitable execution of ICT activities. West Bengal has engaged in national ICT initiatives while executing its own state-specific plans to enhance digital education in secondary schools. A multitude of government and government-assisted secondary schools have been outfitted with ICT laboratories, smart classrooms, projectors, and digital resources through centrally sponsored and state-specific initiatives. The state has implemented digital educational technologies, audio-visual classrooms, and multimedia resources to enhance subject-specific instruction. Secondary school teachers receive regular training in digital pedagogy, ICT tool utilization, and computer literacy through district-level institutes. Numerous secondary schools, particularly those in rural regions, have incorporated computer literacy classes into the regular curriculum. West Bengal implemented internet platforms, WhatsApp-based instruction, television lectures via Banglar Shiksha programs, and mobile connectivity to maintain educational continuity.

CONCLUSION

The scenario of ICT integration in secondary education in India, with special reference to West Bengal, reflects a gradual yet significant transformation in teaching–learning processes. National initiatives such as Digital India, Samagra Shiksha, DIKSHA, SWAYAM, and PM e-Vidya have laid a strong policy foundation for the adoption of ICT in schools, while state-level interventions in West Bengal—such as smart classrooms, ICT@Schools schemes, and online teacher training platforms—have further facilitated this transition. These efforts have expanded access to digital resources, improved instructional delivery, and encouraged learner-centered pedagogies at the secondary level.

IJAMSR

International Conference on Latest Trends in Science, Engineering, Management and Humanities (ICLTSEMH -2025)
19th January, 2025, Noida, India.

Teacher attitudes emerge as a decisive factor in the effective integration of ICT. The study indicates that a majority of secondary school teachers hold a positive attitude towards ICT, recognizing its potential to enhance classroom engagement, conceptual clarity, and students' academic achievement. Teachers with adequate digital competence, prior exposure to ICT tools, and access to continuous professional development tend to demonstrate higher confidence and willingness to integrate technology into their instructional practices. Younger teachers and those with formal ICT training generally show more adaptability and openness to innovative teaching methods.

However, despite positive attitudes, several challenges persist. Inadequate infrastructure, inconsistent internet connectivity, limited access to updated hardware, insufficient technical support, and disparities between urban and rural schools continue to hinder optimal ICT utilization, particularly in West Bengal. Additionally, gaps in systematic training and workload pressures sometimes restrict teachers from fully exploiting ICT's pedagogical potential. These constraints occasionally lead to superficial or irregular use of technology rather than its meaningful integration into curriculum and assessment practices.

In conclusion, while the overall scenario of ICT integration in secondary education in India and West Bengal is promising, its success largely depends on strengthening teacher attitudes through sustained capacity building, infrastructural support, and institutional encouragement. A holistic approach that combines policy support, equitable resource distribution, and continuous teacher empowerment is essential for ensuring that ICT becomes an integral and transformative component of secondary education, ultimately enhancing the quality, equity, and effectiveness of the teaching–learning process.

REFERENCES

1. Allen, C, & Berggren, J (2016). Digital literacy and sustainability – a field study in EFL teacher development', in CALL communities and culture – short papers from EUROCALL. *Papadima-Sophocleous*, 1, 14-19.
2. Bevo, W., Chang, C-Y. (2019). Assessing Teacher's Attitude, Knowledge, and Application (AKA) on STEM: An Effort to Foster the Sustainable Development of STEM Education. *Sustainability*, 11(4), 950.
3. Joaquim, G. (2017). Will education in the mother tongue contribute to the increase of digital literacies?, *World Journal on Educational Technology*, 9 (3), 139-143.
4. Ouma, G.O., Awuor, F.M. & Kyambo, B. (2013). Evaluation of E-learning readiness in public secondary schools in Kenya. *World Applied Programming (WAP Journal)*, 3(10), 493-503.
5. Yeo, M.M.L. (2014). Social media and Social networking applications for Teaching and Learning. *European Journal of Science and Mathematics Education*, 2(1), 53-62.
6. Zhiwen, H. & McGrath, I. (2011). Innovation in higher education in China: are teachers ready to integrate ICT in English language teaching? *Technology, Pedagogy and Education*, 20(1), 41-59.