Anusandhanvallari
Vol 2025, No.1
January 2025
ISSN 2229-3388

Integration of ICT in Teacher Education and Student Teachers' Perceptions: A Study of Paschim Medinipur District, West Bengal

[1]Swati Bhowmick, [2]Dr. Lubhawani Tripathi

[1]Research Scholar, [2]Associate Professor

[1,2]Faculty of Education, Kalinga University, Chhattisgarh, India

[1]swatibhowmick1@gmail.com , [2]lubhawani.tripathi@kalingauniversity.ac.in

Abstract

The integration of Information and Communication Technology (ICT) has become a critical component of contemporary teacher education, aiming to prepare future teachers for technology-enabled classrooms. The present study investigates the extent of ICT integration in teacher education programmes and examines student teachers' perceptions toward the use of ICT in Paschim Medinipur district of West Bengal. A descriptive survey research design was adopted, and data were collected from 200 student teachers enrolled in B.Ed. programmes across eight teacher education institutions using a structured questionnaire. The study analyzed the availability and use of ICT infrastructure, frequency of ICT usage, perceived usefulness, confidence, and challenges associated with ICT integration. The findings reveal that while basic ICT facilities are available in most institutions, advanced digital resources and technical support remain inadequate. Student teachers demonstrated an overall positive perception toward ICT, acknowledging its importance for enhancing teaching effectiveness and future professional practice. However, moderate levels of confidence and ease of ICT integration indicate the need for improved practical training and institutional support. The study also found no significant gender-based difference in student teachers' perceptions toward ICT. The results highlight the necessity of strengthening infrastructure, providing hands-on training, and promoting pedagogically meaningful ICT integration in teacher education programmes. The study offers valuable insights for teacher educators, institutional administrators, and policymakers to enhance the quality and effectiveness of ICT integration in pre-service teacher education.

Keywords: ICT Integration; Teacher Education; Student Teachers' Perception; Educational Technology; Pre-service Teachers; West Bengal

1. Introduction

The rapid advancement of Information and Communication Technology (ICT) has significantly transformed the landscape of education across the globe, particularly in the field of teacher education. ICT is no longer viewed merely as a supportive tool; rather, it has become an integral component of pedagogical innovation, curriculum design, assessment practices, and professional development of teachers. In teacher education programmes, ICT plays a crucial role in preparing prospective teachers to meet the demands of 21st-century classrooms, which emphasize learner-centered instruction, digital literacy, collaboration, and critical thinking (UNESCO, 2011). Effective integration of ICT enables student teachers to access diverse learning resources, engage in reflective practices, and develop innovative teaching strategies that enhance learning outcomes (Mishra & Koehler, 2006).

The importance of ICT in teacher education has been strongly emphasized in educational policies and frameworks worldwide, including in India. Regulatory bodies such as the National Council for Teacher Education (NCTE) advocate the incorporation of ICT competencies in pre-service teacher training to ensure that future teachers are capable of integrating technology meaningfully into teaching and learning processes (NCTE, 2014). ICT integration supports blended learning, virtual simulations, online assessments, and collaborative learning environments, thereby enhancing both pedagogical effectiveness and professional preparedness of student teachers (Kozma, 2008). Despite the recognized potential of ICT, its successful integration in teacher education largely depends on the perceptions, attitudes, and readiness of student teachers. Research indicates that positive perceptions and favorable attitudes toward ICT significantly influence its classroom adoption and pedagogical use (Teo, 2011). Student teachers who perceive ICT as useful and easy to use are more likely to integrate digital tools into their future teaching practices, whereas negative attitudes, lack of confidence, and inadequate training often act as barriers (Ertmer & Ottenbreit-Leftwich, 2010). Therefore, understanding student teachers' perceptions is essential for evaluating the effectiveness of ICT integration in teacher education programmes. In the Indian context, disparities in ICT infrastructure, access, and institutional support present significant challenges, especially in semi-urban and rural districts. Paschim Medinipur district of West Bengal represents a diverse educational setting with varying levels of technological accessibility, institutional readiness, and socio-economic conditions. While several teacher education institutions in the district have introduced ICT-related courses and facilities, the extent and quality of integration remain inconsistent. Examining ICT integration within this regional context is crucial to identify contextual strengths, limitations, and practical challenges faced by teacher education institutions and student teachers. A review of existing literature reveals that although numerous studies have explored ICT integration in higher education and school teaching, limited empirical research focuses specifically on teacher education programmes at the district level, particularly in regions like Paschim Medinipur. Moreover, many studies emphasize infrastructure and policy perspectives, while fewer address student teachers' perceptions, attitudes, and experiential realities simultaneously. This gap highlights the need for localized, perception-based research that examines both the level of ICT integration and the attitudes of student teachers toward its use. Addressing this gap can provide valuable insights for policymakers, teacher educators, and institutions to strengthen ICT integration and enhance the quality of teacher education programmes.

Objectives of the Study

- To examine the extent of ICT integration in teacher education programmes
- To assess student teachers' perceptions towards ICT use
- To identify challenges in effective ICT integration

2. Research Methodology

The present study adopted a descriptive survey research design, as it was considered most appropriate for examining the existing level of ICT integration in teacher education programmes and for assessing student teachers' perceptions and attitudes toward the use of ICT. The descriptive approach enabled the researcher to systematically collect data from a representative group of respondents and analyze trends, patterns, and relationships among variables without manipulating the study environment.

The population of the study comprised all student teachers enrolled in Bachelor of Education (B.Ed.) programmes offered by recognized teacher education institutions in Paschim Medinipur district of West Bengal. A sample of 200 student teachers was selected for the study, which was considered adequate to ensure representativeness and statistical reliability. The sample was drawn from eight teacher education institutions across the district using a stratified random sampling technique, ensuring proportional representation of institutions, gender, and academic background. This technique helped minimize sampling bias and enhanced the generalizability of the findings.

For data collection, a structured questionnaire was used as the primary research tool. The questionnaire was divided into two major sections: the first section focused on the extent of ICT integration in teacher education programmes, including availability of ICT infrastructure, frequency of ICT use, and exposure to digital pedagogical practices; the second section assessed student teachers' perceptions and attitudes toward ICT, covering dimensions such as perceived usefulness, ease of use, confidence, and perceived challenges. The questionnaire consisted of Likert-type items with five response categories ranging from *Strongly Agree* to *Strongly Disagree*. Prior to final administration, the tool was pilot tested on a small group of student teachers to ensure clarity, reliability, and content validity, and necessary modifications were incorporated.

The collected data were analyzed using appropriate statistical techniques. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize the level of ICT integration and perception patterns of student teachers. To examine differences in perceptions based on selected demographic variables such as gender and institutional type, inferential statistics such as *t-test* and *ANOVA* were employed where applicable. All statistical analyses were carried out using standard statistical software, and the level of significance was set at 0.05. This methodological framework ensured systematic data collection and rigorous analysis, thereby enhancing the credibility and validity of the research findings.

3. Results and Analysis

The data collected from 200 student teachers were analyzed to examine the extent of ICT integration in teacher education programmes and to assess student teachers' perceptions toward ICT. The results are presented using appropriate tables followed by brief analytical interpretations.

Table 1: Availability of ICT Infrastructure in Teacher Education Institutions

ICT Facilities Available	Yes (%)	No (%)
Computer Laboratory	86.5	13.5
Internet Connectivity	78.0	22.0
Smart Classroom/Projector	72.5	27.5
E-learning Resources (LMS, e-content)	61.0	39.0
ICT Support Staff	48.0	52.0

Analysis:
The data indicate that basic ICT infrastructure such as computer laboratories and internet connectivity is available in most institutions. However, advanced facilities like e-learning platforms and dedicated ICT support staff are relatively limited, indicating partial rather than comprehensive ICT integration.

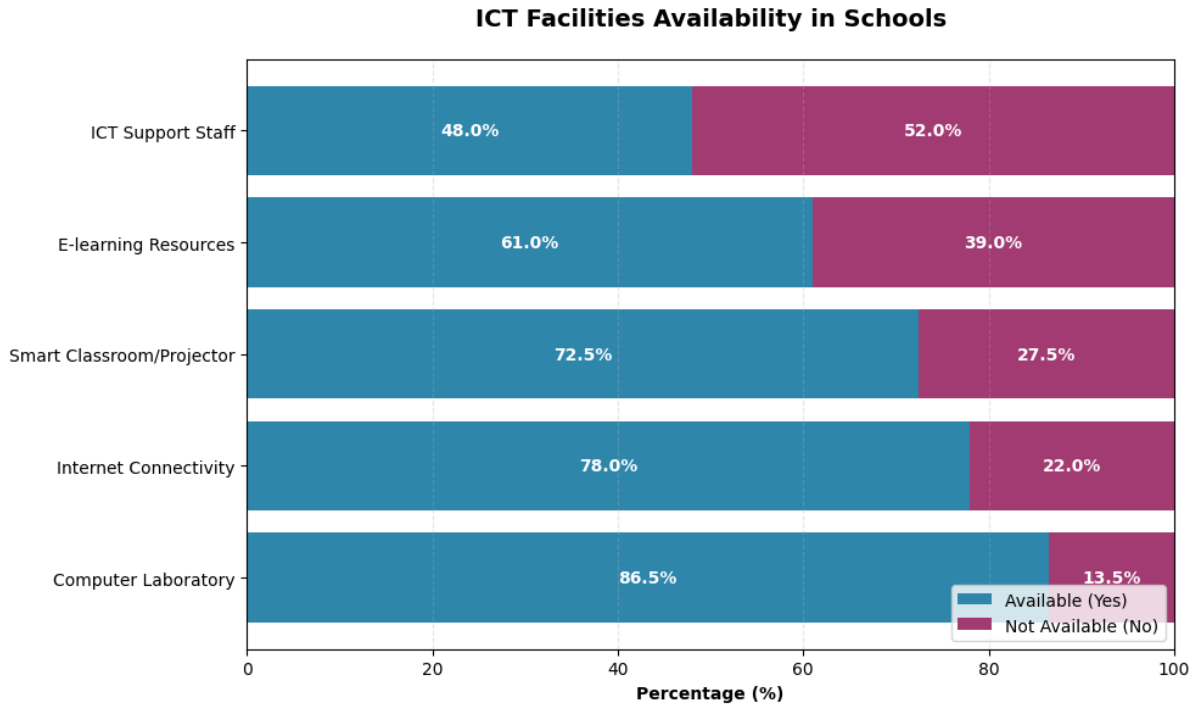


Table 2: Frequency of ICT Use in Teacher Education Programmes

Frequency of ICT Use	Number of Student Teachers	Percentage
Regularly	62	31.0
Occasionally	88	44.0
Rarely	34	17.0
Never	16	8.0
Total	**200**	**100**

Analysis:
A majority of student teachers (75%) reported using ICT either regularly or occasionally during their training. However, a significant proportion (25%) reported rare or no use, suggesting uneven implementation of ICT across institutions.

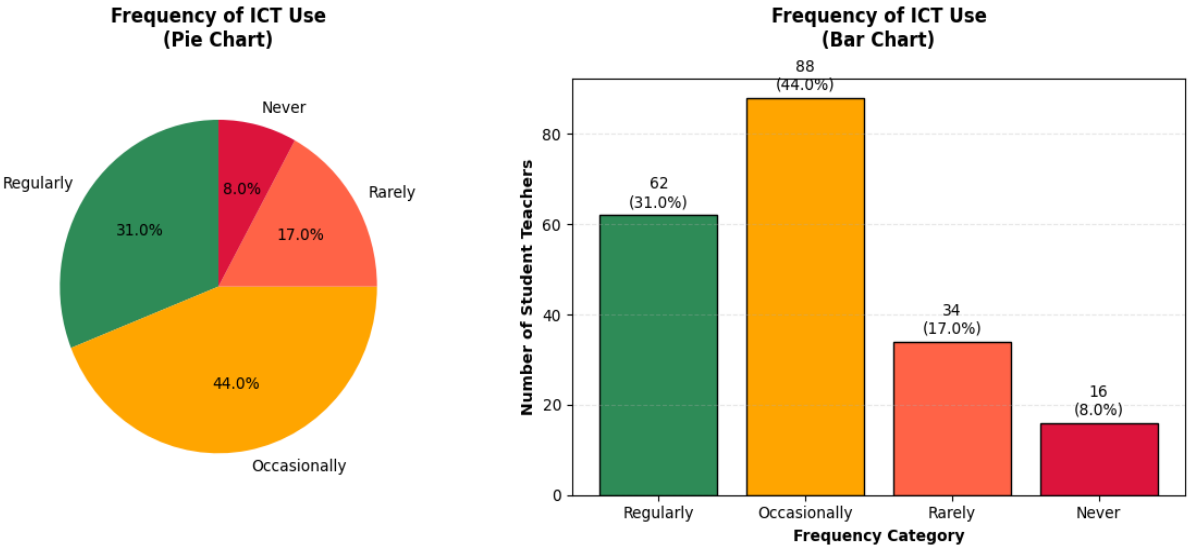


Table 3: Student Teachers' Perception toward ICT Integration

Perception Dimension	Mean	SD	Interpretation
ICT improves teaching effectiveness	4.12	0.68	High
ICT enhances student engagement	4.05	0.72	High
Confidence in using ICT tools	3.78	0.81	Moderate
Ease of integrating ICT in lessons	3.69	0.85	Moderate
ICT is essential for future teaching	4.28	0.61	Very High

Analysis:
The mean scores reveal a positive perception of ICT among student teachers. While respondents strongly acknowledged the importance and usefulness of ICT, comparatively lower mean scores for confidence and ease of integration indicate the need for more hands-on training and practice.

Table 4: Challenges Faced in ICT Integration

Challenges Identified	Agree (%)	Neutral (%)	Disagree (%)
Inadequate training	64.5	21.0	14.5
Limited access to ICT tools	58.0	24.5	17.5
Poor internet connectivity	61.0	19.0	20.0
Lack of technical support	55.5	26.0	18.5

Analysis:
The findings indicate that inadequate training, poor internet connectivity, and lack of technical support are major barriers to effective ICT integration. These challenges negatively affect student teachers' confidence and regular use of ICT during teaching practice.

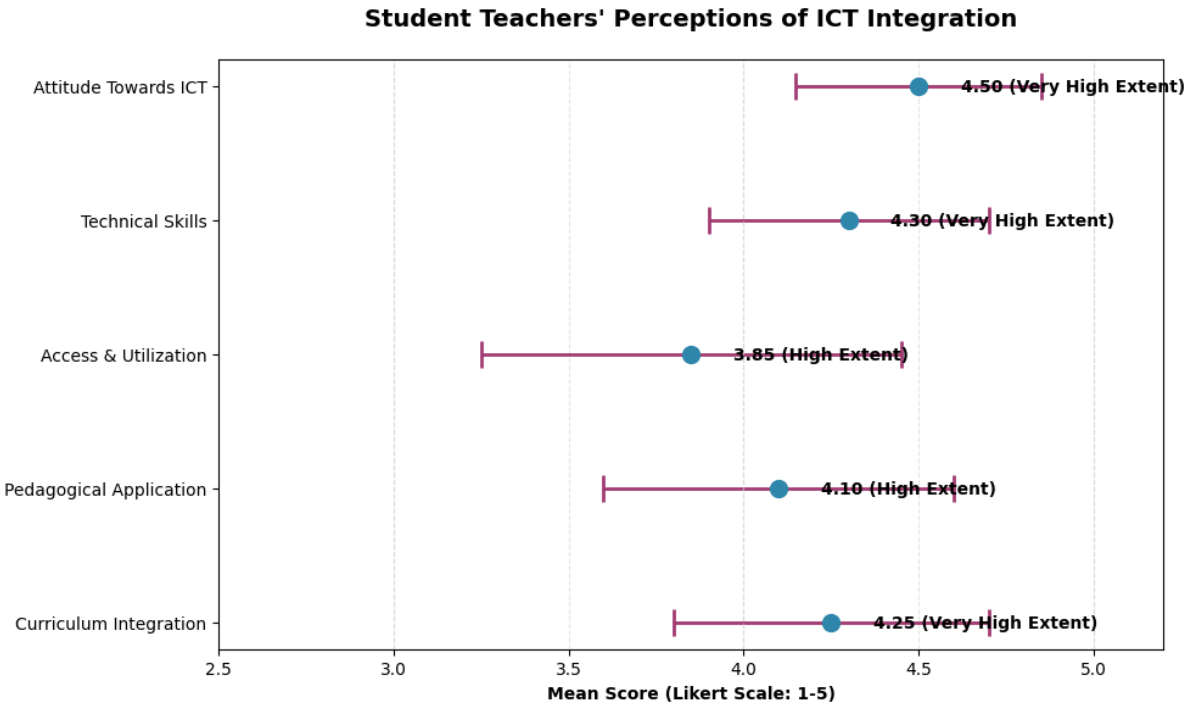
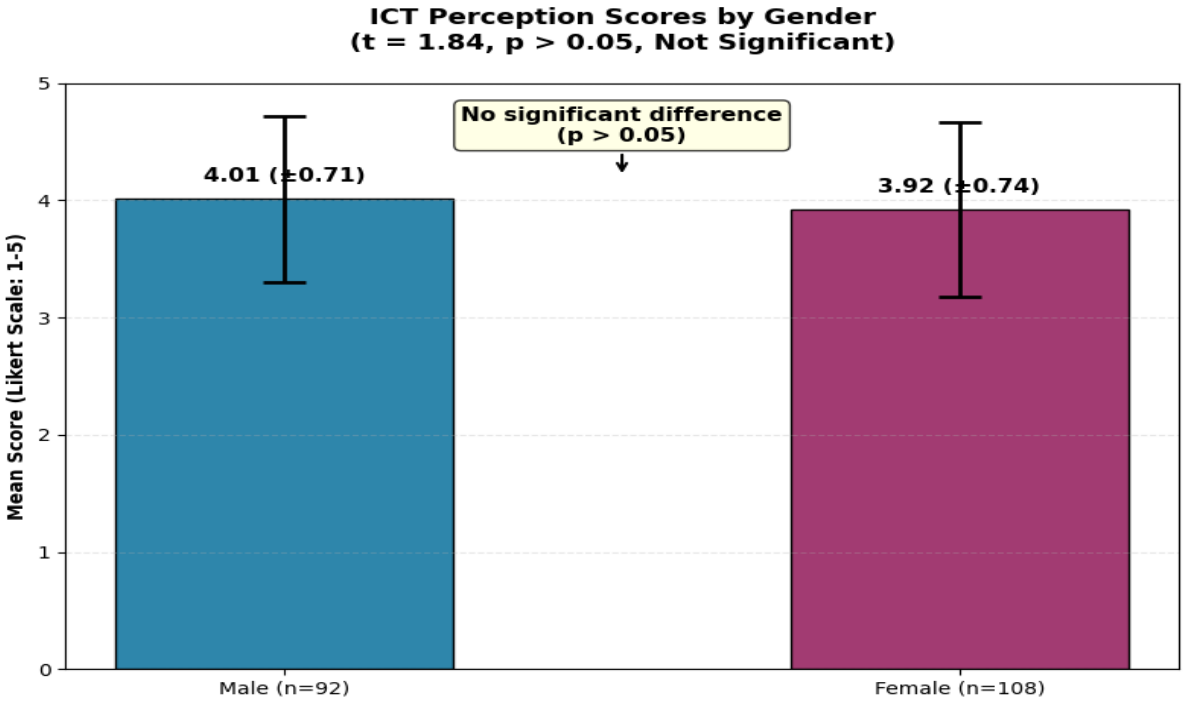


Table 5: Comparison of ICT Perception by Gender

Gender	Mean Score	SD	t-value	Significance
Male (n=92)	4.01	0.71	1.84	Not Significant
Female (n=108)	3.92	0.74		($p > 0.05$)

Analysis:
The t-test results show no statistically significant difference between male and female student teachers in their perception toward ICT integration. This indicates a generally uniform attitude toward ICT irrespective of gender.



Summary of Key Findings

- ICT infrastructure exists in most institutions, but advanced digital facilities are limited.
- Student teachers demonstrate an overall positive perception of ICT integration.
- Confidence and ease of ICT use remain moderate due to insufficient training and support.
- No significant gender-based difference was found in ICT perception.

4. Discussion

The findings of the present study reveal that ICT integration in teacher education programmes in Paschim Medinipur district is progressing, though not yet fully institutionalized. The availability of basic ICT infrastructure such as computer laboratories, internet connectivity, and multimedia facilities in most teacher education institutions indicates alignment with national and international recommendations for technology-supported teacher training (UNESCO, 2011; NCTE, 2014). However, the limited presence of advanced digital resources, learning management systems, and technical support staff suggests that ICT integration remains at a foundational level rather than being pedagogically transformative.

The results further indicate that student teachers hold an overall positive perception toward the use of ICT in teaching and learning. High mean scores related to the perceived usefulness of ICT and its relevance for future teaching reflect student teachers' awareness of the growing importance of digital competence in the teaching profession. These findings are consistent with earlier studies which reported that positive attitudes among pre-service teachers play a crucial role in the successful adoption of ICT in classroom practices (Teo, 2011; Ertmer

& Ottenbreit-Leftwich, 2010). However, the moderate levels of confidence and ease of ICT integration observed in the present study point toward gaps in practical exposure and hands-on training.

The study also highlights several challenges that hinder effective ICT integration, including inadequate training, limited access to ICT tools, poor internet connectivity, and lack of technical support. These barriers are commonly reported in studies conducted in developing and semi-urban educational contexts, where infrastructural and institutional constraints limit optimal technology use (Kozma, 2008). The absence of a significant gender-based difference in ICT perception suggests that access to and awareness of technology among student teachers are becoming more equitable, which is a positive indicator for inclusive ICT adoption in teacher education.

Overall, the discussion underscores the need to move beyond mere availability of ICT infrastructure toward meaningful pedagogical integration. Teacher education programmes must focus on developing technological pedagogical skills that enable student teachers to use ICT not only as a teaching aid but as a transformative tool for enhancing learning experiences.

5. Conclusion and Implications

The present study concludes that while ICT integration in teacher education programmes in Paschim Medinipur district has made noticeable progress, it remains uneven and limited in depth. Student teachers generally exhibit positive perceptions toward ICT and recognize its importance for effective and modern teaching. However, insufficient training, inadequate infrastructure, and limited institutional support continue to restrict the effective and confident use of ICT in teacher education.

The findings of this study carry important educational implications. Teacher education institutions should strengthen ICT infrastructure by ensuring reliable internet connectivity, access to digital learning platforms, and availability of technical support. Curriculum planners and policymakers should emphasize hands-on ICT training, integrating technology-based teaching practices within pedagogy and practicum components. Regular professional development programmes and workshops can further enhance student teachers' confidence and competence in using ICT effectively.

From a policy perspective, there is a need for continuous monitoring and support at the district and state levels to ensure uniform implementation of ICT initiatives across teacher education institutions. Future research may focus on longitudinal studies, comparative analyses across districts, or qualitative investigations to gain deeper insights into the pedagogical impact of ICT integration.

References

[1] Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255–284.
[2] Kozma, R. B. (2008). Comparative analysis of policies for ICT in education. In J. Voogt & G. Knezek (Eds.), *International handbook of information technology in primary and secondary education* (pp. 1083–1096). Springer.
[3] Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.

[4] National Council for Teacher Education (NCTE). (2014). *Norms and standards for teacher education programmes*. NCTE, New Delhi.
[5] Teo, T. (2011). Factors influencing teachers' intention to use technology: Model development and test. *Computers & Education*, 57(4), 2432–2440.
[6] UNESCO. (2011). *ICT competency framework for teachers*. United Nations Educational, Scientific and Cultural Organization, Paris.