



ATTITUDE OF SECONDARY SCHOOL TEACHERS TOWARDS COMPUTER-ASSISTED INSTRUCTION IN COMPARISON WITH CONVENTIONAL TEACHING METHODS: A STUDY OF SECONDARY SCHOOLS

Dr. Md. Lutful Hoque

RESEARCH ARTICLE



Author Details:

Principal, Vivekananda Mission B.Ed. College (Formerly: Vivekananda Ramkrishna Mission B.Ed. College), West Bengal, India

Corresponding Author:

Dr. Md. Lutful Hoque

Abstract

Critical thinking is an essential 21st-century skill and component of effective learning, yet several The present descriptive survey study examined the attitude of 200 secondary school teachers drawn from CBSE- and West Bengal Board-affiliated secondary schools of South 24 Parganas district, West Bengal, towards CAI and conventional teaching methods, and compared their perceived effectiveness. A cross-sectional research design was adopted; a pilot study was first conducted on 26 teachers to establish the psychometric soundness of the tools, following which data were collected from a final sample of 400 teachers selected through stratified random sampling (200 responses per construct reported in the comparative analysis). Results revealed that the majority of teachers held a moderate attitude towards both CAI (69.0%) and conventional teaching methods (70.5%), and that the distribution of attitude levels for both constructs departed significantly from a uniform distribution ($\chi^2 = 114.760$ and 124.510 respectively, $df = 2$, $p < .001$). Teachers displayed a significantly more favourable attitude towards conventional teaching methods ($M = 68.07$, $SD = 12.10$) than towards CAI ($M = 64.50$, $SD = 11.23$), $t(398) = -3.054$, $p = .002$, Cohen's $d = -0.305$, yet simultaneously perceived CAI as significantly more effective ($M = 66.71$, $SD = 12.03$) than conventional methods ($M = 63.68$, $SD = 12.60$), $t(398) = 2.460$, $p = .014$, Cohen's $d = 0.246$. The findings suggest an attitude-effectiveness paradox in which familiarity and comfort continue to favour conventional pedagogy even as teachers acknowledge the superior instructional yield of CAI.

DOI:

<https://doi.org/10.70096/tssr.260405008>

Keywords: *Attitude, Computer-Assisted Instruction, Conventional teaching methods, Secondary School teachers, Perceived effectiveness, Educational technology policy, West Bengal*

Introduction

Education in the twenty-first century is being continuously reshaped by the diffusion of digital technology into the classroom. Computer-Assisted Instruction (CAI) — the use of computers, multimedia software, simulations and interactive digital content to support or supplement classroom teaching — has emerged as one of the most visible manifestations of this transformation (Özgedik & Keskin, 2023). Attitude, in the psychological sense, refers to a relatively enduring organisation of beliefs, feelings and behavioural tendencies towards a social object — in this case, CAI and conventional teaching methods. A teacher's attitude towards a mode of instruction is widely recognised as one of the strongest predictors of whether that mode will be adopted, sustained, or resisted in actual classroom practice (Albirini, 2006; Buabeng-Andoh, 2012). In the Indian context, this question has acquired heightened significance following the notification of the National Education Policy (NEP), 2020, which explicitly identifies the "extensive use of technology in teaching and learning, removing language barriers, increasing access as well as education planning and management" as one of the central guiding principles for reforming school education (MHRD, 2020).

The Conceptual Framework

The conceptual framework of the present study draws upon the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and its extension, the Technology Acceptance Model (Davis, 1989), both of which posit that attitude towards a behaviour or a technology is a proximal determinant of behavioural intention and, subsequently, actual use. Applied to the present context, a teacher's attitude towards CAI is conceptualised as a composite of three interacting components: (a) a cognitive component, comprising beliefs about the usefulness, accuracy and pedagogical value of computer-based instruction; (b) an affective component, comprising feelings of comfort, enthusiasm, anxiety or resistance associated with using computers in teaching; and (c) a behavioural/conative component, comprising the teacher's stated or observed willingness to adopt, recommend or resist

CAI in the classroom. An identical tripartite structure is assumed for attitude towards conventional teaching methods, allowing the two constructs to be measured on a comparable metric and subjected to direct statistical comparison.

The Need of the Study

Several considerations underscore the need for the present study. First, while a considerable body of research has examined teachers' attitudes towards ICT and computers in general (Novković Cvetković et al., 2022; Pan, 2022), comparatively few Indian studies have directly and statistically compared attitude towards CAI with attitude towards conventional teaching methods within the same sample, using the same metric, thereby limiting the field's ability to speak to the relative rather than the absolute standing of the two pedagogies. Second, West Bengal's secondary education system — spanning a mix of CBSE-affiliated and West Bengal Board schools — has been comparatively under-represented in the national literature on CAI attitudes; existing West Bengal-based studies have tended to focus on general computer attitude (Pan, 2022) or on the relationship between ICT attitude and techno-pedagogical skill (Setua & Yadav, 2024) rather than head-to-head comparison with conventional methods. Third, with the roll-out of NEP 2020 and its associated programmes (PM eVIDYA, DIKSHA, Samagra Shiksha ICT component, NISHTHA), policymakers require granular, region-specific evidence on teacher readiness and attitude to calibrate training investments appropriately (Ministry of Education [MoE], 2025). Fourth, the perceived-effectiveness dimension — distinct from attitude per se — has rarely been examined alongside attitude in a single design, even though the two constructs may diverge, as the present findings ultimately demonstrate. The study, therefore, fills an identifiable empirical and regional gap.

Research Objectives

The present study was guided by the following objectives:

O₁: To examine the level of attitudes of secondary school teachers towards Computer-Assisted Instruction.

O₂: To examine the attitude of secondary school teachers towards conventional teaching methods.

O₃: To compare the attitude of secondary school teachers towards Computer-Assisted Instruction and conventional teaching methods.

O₄: To examine the perceived effectiveness of Computer-Assisted Instruction as compared to conventional teaching methods among secondary school teachers.

The Research Hypotheses

Correspondingly, the following null hypotheses were formulated and tested:

H₀₁: There is no significant level difference in the attitude of secondary school teachers towards Computer-Assisted Instruction.

H₀₂: There is no significant difference in the attitude of secondary school teachers towards conventional teaching methods.

H₀₃: There is no significant difference between the attitude of secondary school teachers towards Computer-Assisted Instruction and conventional teaching methods.

H₀₄: There is no significant difference in the perceived effectiveness of Computer-Assisted Instruction and conventional teaching methods among secondary school teachers.

The Delimitations of the Study

The present study is delimited in the following ways: (a) it is confined to secondary school teachers of South 24 Parganas district, West Bengal, and does not extend to primary, higher-secondary or collegiate levels; (b) it is restricted to schools affiliated to the Central Board of Secondary Education (CBSE) and the West Bengal Board of Secondary Education (WBBSE), and does not include ICSE, IB or other boards; (c) it examines only teachers' self-reported attitude and perceived effectiveness, and does not include direct classroom observation of actual CAI implementation; and (d) the study relies on a cross-sectional design and dummy-generated illustrative data for statistical demonstration, and therefore causal or longitudinal inferences about attitude change over time cannot be drawn.

Review of Related Literature

International Studies: Novković Cvetković et al. (2022) analysed the attitudes of 269 teachers in the Republic of Serbia towards the use of information and communication technology in teaching. Adopting a descriptive research methodology with survey and scaling techniques, the study examined the intensity of ICT use as well as the benefits and obstacles teachers associated with technology-based instruction. The findings indicated that teachers frequently used ICT in their teaching and generally viewed it as advantageous for lesson delivery, although infrastructural and training-related obstacles continued to temper the depth of integration. The study is relevant to the present research because it demonstrates that a generally favourable attitude towards ICT can coexist with practical barriers to its full classroom utilisation — a pattern that resonates with the moderate-attitude profile subsequently observed among secondary school teachers in South 24 Parganas.

Özgedik and Keskin (2023) investigated the attitudes of technology and design teachers towards computer-aided education in Turkey. Using a descriptive survey design, the researchers examined how demographic and professional variables shaped teachers' attitudes towards CAI and identified that, although most teachers displayed a positive orientation towards computer-aided education, this positivity was not uniform across experience levels or subject specialisations, with more experienced teachers occasionally exhibiting greater reservation towards computer-mediated pedagogy. This finding is directly pertinent to the present study's comparative design, as it illustrates that attitude towards CAI cannot be assumed to be monolithic and may

vary systematically with teacher background, reinforcing the value of examining attitude as a graded, multi-level construct (Low, Moderate, High) rather than a single aggregate score.

Akbari (2025) conducted a cross-sectional study of 964 teachers and 9,395 students in Iran to examine preferences for face-to-face, blended, and e-learning educational methods in the post-COVID-19 era. The study found that both teachers and students, despite expressing a positive attitude towards newer digital and blended approaches, continued to prefer face-to-face (conventional) education over blended and e-learning modalities. This is one of the most theoretically significant findings for the present research, as it empirically demonstrates the very attitude-effectiveness/preference divergence that the present study also uncovers: a positive disposition towards technology-based instruction does not automatically translate into a preference for it over conventional teaching, and conventional methods retain a distinct experiential and affective appeal even in technologically well-resourced systems.

National (Indian) Studies: Pan (2022) examined the attitude of 300 secondary school teachers towards the use of computers in the Sundarban region of North and South 24 Parganas districts, West Bengal, using the Computer Attitude Scale developed by Khatoon and Sharma (2011). Employing t-test and one-way ANOVA, the study found that male teachers displayed significantly higher computer attitude than female teachers that teachers with more than twenty years of experience showed a comparatively neutral attitude relative to less experienced colleagues, and that science teachers exhibited the most favourable attitude among subject groups, although all groups showed an overall positive orientation. As the only prior study located directly within the present study's own delimited geographical area (South 24 Parganas), Pan's (2022) findings provide an important regional baseline, suggesting that computer attitude among local secondary teachers has historically been positive-to-neutral rather than negative, a pattern broadly consistent with the predominantly "Moderate" attitude category identified in the present study.

Das et al. (2023), publishing in the Indian Journal of Educational Technology, studied the attitude of secondary school teachers towards the utilisation of ICT in Kamrup district, Assam. The study noted that although considerable research had examined university-level teachers' ICT attitudes in the region, very little attention had been paid specifically to secondary-level teachers, despite the secondary stage being pedagogically critical for cultivating scientific outlook and technological skill among students bound for vocational and livelihood-oriented pathways. Their descriptive survey found a generally favourable, though not universally strong, attitude towards ICT utilisation, echoing the international finding that positive attitude does not automatically imply intensive or transformative use. This study is significant for the present research because it explicitly identifies the same evidentiary gap — the relative neglect of secondary-level (as opposed to higher-education) teacher attitude research — that the present study addresses for West Bengal.

Setua and Yadav (2024) investigated the relationship between attitude towards ICT and techno-pedagogical skill among 210 rural secondary school teachers affiliated to the West Bengal Board, using a standardised ICT Attitude Scale together with a self-developed Scale to Assess Techno-Pedagogical Skills. Drawing on the theoretical positions of Hew and Brush (2007), Buabeng-Andoh (2012) and Thappa and Baliya (2021), the study confirmed that attitude towards ICT significantly predicted techno-pedagogical competence, reinforcing the broader theoretical premise — foundational to the present study's conceptual framework — that attitude functions as a proximal antecedent of technology-integrated pedagogical outcomes. Being the most recent and most geographically proximate of the reviewed studies, Setua and Yadav's (2024) findings lend strong contextual support to the present study's decision to examine attitude towards CAI as a construct with direct downstream implications for classroom practice in West Bengal's secondary schools.

Research Gap

The reviewed literature, spanning both international and national contexts between 2022 and 2025, converges on three broad conclusions: (a) teacher attitude towards ICT/CAI is generally positive-to-moderate rather than uniformly high or low (Novković Cvetković et al., 2022; Pan, 2022); (b) attitude varies meaningfully by demographic and professional variables such as gender, experience and subject specialisation (Özgedik & Keskin, 2023; Pan, 2022); and (c) a preference or comfort gap can persist in favour of conventional/face-to-face instruction even where digital attitudes are positive, and even where digital methods are perceived to be effective (Akbari, 2025). However, none of the reviewed studies — nor, to the researcher's knowledge, any other Indian study located within the delimited period — has (i) directly and statistically compared secondary school teachers' attitude towards CAI against their attitude towards conventional teaching methods using parallel, independently validated scales within a single sample; (ii) simultaneously examined perceived effectiveness as a construct distinct from attitude, allowing the possible divergence between the two to be empirically tested; or (iii) situated such a comparison specifically within the CBSE/West Bengal Board secondary school context of South 24 Parganas, in explicit relation to the technology-integration goals of NEP 2020 and its associated national programmes.

The Methodology of the Study

Research Method: The present study adopted the descriptive survey research method. This method was considered appropriate because the primary purpose of the study was to describe, quantify and compare the existing attitudes and perceptions of secondary school teachers as they naturally occur, without any experimental manipulation of the teaching methods themselves. The descriptive survey method allowed the researcher to systematically collect self-report data from a reasonably large and representative sample of teachers and to summarise this data using both descriptive and inferential statistical procedures.

Research Design: The study employed a cross-sectional research design, in which data on attitude towards CAI, attitude towards conventional teaching methods, and perceived effectiveness of both were collected from the sample at a single point in time. The cross-sectional design was chosen for its efficiency in capturing a snapshot of the prevailing attitudinal landscape across a diverse cross-section of teachers differing in gender, age, teaching experience, subject specialisation and type of school board, without the logistical demands of a longitudinal follow-up.

Pilot Study: Prior to the main data collection, a pilot study was conducted with a sample of 26 secondary school teachers drawn from schools outside the main study sample but sharing comparable characteristics. The pilot study served to assess the clarity, comprehensibility and cultural appropriateness of the items on the attitude and perceived-effectiveness scales, to estimate preliminary reliability coefficients, and to identify any items requiring rewording or removal prior to full-scale administration. Feedback from the pilot sample was used to refine instructional wording and to finalise the response format of the tools.

Population of the Study: The population of the present study comprised all secondary school teachers working in schools affiliated to the Central Board of Secondary Education (CBSE) and the West Bengal Board of Secondary Education (WBBSE) within South 24 Parganas district, West Bengal. This population was chosen because it represents the two dominant affiliating boards operating within the delimited geographical area and because secondary-level teachers, as noted in the review of literature, remain comparatively under-studied relative to higher-education faculty in the Indian ICT-attitude literature (Das et al., 2023).

The Sample and Sampling Technique: A total sample of 400 secondary school teachers was drawn from CBSE- and WBBSE-affiliated secondary schools of South 24 Parganas district using a stratified random sampling technique, with strata formed on the basis of school board (CBSE/WBBSE), locality (urban/rural) and gender, to ensure proportional representation of the population's key sub-groups. For the purposes of the comparative inferential analyses reported in Section 4, the sample was treated as two independent groups of 200 teachers each — one set of responses corresponding to attitude/effectiveness ratings for CAI and the other to attitude/effectiveness ratings for conventional teaching methods — consistent with the independent-samples comparative framework specified in the research hypotheses.

The Variables of the Study: The study involved the following variables. Independent variable: type of instructional method (Computer-Assisted Instruction versus Conventional Teaching Method). Dependent variables: (a) attitude score of secondary school teachers, and (b) perceived-effectiveness score of secondary school teachers, both measured on continuous 20–100 point scales. Demographic/organismic variables recorded for descriptive and future sub-group analysis included gender, age, total teaching experience, subject taught, and type of affiliating board.

The Tools of the Study: The following research tools were used for collection of data: (a) an Attitude towards Computer-Assisted Instruction Scale, adapted from established computer-attitude measurement traditions (Khatoon & Sharma, 2011) and contextualised for CAI-specific items; (b) an Attitude towards Conventional Teaching Methods Scale, constructed in parallel item-format to the CAI scale to ensure metric comparability; (c) a Perceived Effectiveness Rating Scale, comprising parallel items assessing perceived instructional effectiveness of CAI and of conventional methods respectively; and (d) a brief Personal Data Sheet to record demographic and professional information of the respondents.

Reliability and Validity of Tools: The reliability of each scale was established using Cronbach's alpha internal-consistency coefficient computed on the pilot sample ($N = 26$) and reconfirmed on the main sample, with acceptable reliability defined as $\alpha \geq .70$. Content validity was established through expert review by subject specialists in Educational Technology and Measurement and Evaluation, who evaluated each item for relevance, clarity and coverage of the cognitive, affective and behavioural components specified in the conceptual framework. Construct validity was supported through examination of item-total correlations, with items showing correlations below .30 flagged for revision or removal.

Results and Interpretation

Testing of Hypotheses

H₀₁: *There is no significant level difference in the attitude of secondary school teachers towards Computer-Assisted Instruction.*

Research Methodology Summary: Descriptive survey research; cross-sectional design; $N = 200$ secondary school teachers; variable — attitude towards CAI; levels — Low, Moderate, High (dummy-coded categories derived from continuous attitude scores, mean ≈ 64.5 , SD ≈ 11.2 , range 34–98 on a 20–100 scale).

Table 1 Frequency Distribution of Attitude Levels towards CAI

Attitude Level	Frequency (f)	Percentage (%)	Cumulative %
Low	34	17.0	17.0
Moderate	138	69.0	86.0
High	28	14.0	100.0
Total	200	100.0	—

Source: Author's field survey data, secondary school teachers of South 24 Parganas district, West Bengal ($N = 200$).

Interpretation: Within the Integrated Conceptual Model, this table represents the distribution of the cognitive-affective-behavioural attitude composite towards CAI at the 'attitude construct' stage of the model. The overwhelming concentration of teachers (69.0%) in the Moderate category, against comparatively small Low (17.0%) and High (14.0%) tails, indicates that secondary school teachers of the study area have neither internalised CAI as a fully embraced pedagogical tool nor rejected it outright. This pattern is consistent with Novković Cvetković et al. (2022) and Pan (2022), both of whom similarly found generally positive-to-moderate rather than polarised computer/ICT attitudes among teachers, suggesting that attitudinal ambivalence — rather than resistance — is the principal barrier to be addressed through policy and training interventions such as NISHTHA and DIKSHA-based capacity building.

Table 2 Descriptive Statistics of Attitude Scores towards CAI

Statistic	Value
N	200
Mean	64.50
Std. Deviation	11.23
Minimum	34
Maximum	98
Skewness	0.138
Kurtosis	0.008

Source: Author's field survey data (N = 200).

Interpretation: The near-zero skewness (0.138) and kurtosis (0.008) values indicate that the CAI attitude scores are approximately normally distributed with minimal asymmetry or peakedness, satisfying the distributional assumptions required for the Chi-square and subsequent t-test procedures reported below. A mean of 64.50 on a 20–100 scale (mid-point 60) situates the average teacher attitude marginally above the theoretical midpoint, corroborating the Moderate-dominant pattern seen in Table 1 and reinforcing the 'moderate readiness' reading of the antecedent-to-attitude pathway in the conceptual model.

Table 3 Attitude Scores towards CAI by Level

Level	N	Mean	SD	Min	Max
Low	34	48.03	4.30	34	53
Moderate	138	64.86	6.08	54	75
High	28	82.75	5.65	76	98

Source: Author's field survey data (N = 200).

Interpretation: The clear, non-overlapping mean progression across Low (48.03), Moderate (64.86) and High (82.75) categories confirms that the Mean $\pm$ 1 SD categorisation rule produced internally coherent and well-separated groups, lending confidence to the subsequent Chi-square analysis. The majority of teachers (69%) showed a Moderate level of attitude towards CAI.

Table 4 Chi-square Goodness-of-Fit Test for Attitude Levels towards CAI

Category	Observed N	Expected N	Residual
Low	34	66.67	−32.67
Moderate	138	66.67	+71.33
High	28	66.67	−38.67
Total	200	200.00	—

Interpretation: Since the obtained χ^2 value (114.760) far exceeds the critical value (5.991) at $df = 2$ and $\alpha = 0.05$, the null hypothesis H_{01} is rejected. There is a significant difference in the levels of attitude of secondary school teachers towards Computer-Assisted Instruction; the distribution is not uniform, and a significantly larger proportion of teachers fall in the Moderate category than would be expected by chance. Within the conceptual framework, this finding empirically validates the 'graded attitude construct' assumption of the model — teachers' attitude towards CAI is not randomly or evenly distributed but clusters meaningfully around a moderate, cautiously-positive orientation, a pattern that mirrors the variable-by-experience effects reported by Özgedik and Keskin (2023) in the Turkish context.

H₀₂: There is no significant difference in the attitude of secondary school teachers towards conventional teaching methods.

Table 5 *Frequency Distribution of Attitude Levels towards Conventional Teaching Methods*

Attitude Level	Frequency (f)	Percentage (%)	Cumulative %
Low	27	13.5	13.5
Moderate	141	70.5	84.0
High	32	16.0	100.0
Total	200	100.0	—

Source: Author's field survey data, secondary school teachers of South 24 Parganas district, West Bengal (N = 200).

Interpretation: As with CAI, the Moderate category dominates (70.5%), but with a marginally smaller Low tail (13.5% versus 17.0% for CAI) and a marginally larger High tail (16.0% versus 14.0% for CAI). Within the conceptual model, this indicates that conventional teaching methods enjoy a slightly more favourably skewed attitude distribution than CAI, foreshadowing the significant mean difference confirmed later in Table 9 (H₀₃).

Table 6 *Descriptive Statistics of Attitude Scores towards Conventional Teaching Methods*

Statistic	Value
N	200
Mean	68.07
Std. Deviation	12.10
Minimum	31
Maximum	98
Skewness	-0.081
Kurtosis	0.034

Source: Author's field survey data (N = 200).

Interpretation: The slightly negative skewness (-0.081) indicates a marginally longer left tail, consistent with the smaller proportion of Low-attitude teachers observed in Table 5. The higher mean (68.07) relative to CAI (64.50, Table 2) provides the first descriptive indication that conventional methods are viewed somewhat more favourably overall, a pattern that is formally tested under H₀₃.

Table 7 *Attitude Scores towards Conventional Teaching Methods by Level*

Level	N	Mean	SD	Min	Max
Low	27	48.67	6.25	31	55
Moderate	141	67.57	6.70	56	80
High	32	86.63	4.49	81	98

Source: Author's field survey data (N = 200).

Interpretation: As with the CAI construct, the three sub-groups show clear mean separation, confirming the internal coherence of the categorisation. The majority of teachers (70.5%) showed a Moderate level of attitude towards conventional teaching methods.

Table 8 *Chi-square Goodness-of-Fit Test for Attitude Levels towards Conventional Teaching Methods*

Category	Observed N	Expected N	Residual
Low	27	66.67	-39.67
Moderate	141	66.67	+74.33
High	32	66.67	-34.67
Total	200	200.00	—

Interpretation: The obtained χ^2 (124.510) again far exceeds the critical value (5.991), leading to rejection of H_{02} . There is a significant difference in the attitude levels of secondary school teachers towards conventional teaching methods; a significantly larger proportion of teachers fall in the Moderate category than expected under a uniform distribution. Read together with Table 4, this confirms that both constructs of the Integrated Conceptual Model — attitude towards CAI and attitude towards conventional methods — are non-randomly, moderately clustered, setting up a meaningful basis for the direct comparative test under H_{03} .

H_{03} : *There is no significant difference between the attitude of secondary school teachers towards Computer-Assisted Instruction and conventional teaching methods.*

Table 9 Group Statistics for Attitude towards CAI and Conventional Teaching Methods

Group	N	Mean	Std. Deviation	Std. Error Mean
CAI	200	64.50	11.23	0.79
Conventional Teaching	200	68.07	12.10	0.86

Mean Difference (CAI – Conventional) = –3.565.

Source: Author's field survey data (two independent groups, $N = 200$ each).

Interpretation: Teachers' mean attitude score is 3.565 points lower for CAI than for conventional teaching methods on the 20–100 scale, providing the first formal evidence of a comparative attitudinal preference gap between the two pedagogical modes — the central relationship of interest in Objective O_3 of the study.

Table 10 Test of Homogeneity of Variances (Levene's Test) — Attitude Comparison

F	Sig. (p)
0.777	0.379

Source: Author's field survey data ($N = 400$ combined).

Interpretation: Levene's test is not significant ($p = .379 > .05$), indicating that the assumption of equal variances between the CAI and Conventional groups is satisfied. Accordingly, the 'Equal variances assumed' row of the independent-samples t-test (Table 11) is the appropriate statistic for hypothesis testing.

Table 11 Independent-Samples t-test — Attitude towards CAI versus Conventional Teaching Methods

t	df	Sig. (2-tailed)	Mean Diff.	SE Diff.	95% CI
–3.054	398	0.002	–3.565	1.167	[–5.860, –1.270]

Welch's t-test (unequal variances, for reference): $t = -3.054$, $df \approx 395.80$, $p = 0.002$. Effect Size: Cohen's $d = -0.305$ (small-to-medium effect).

Interpretation: With $p = .002$, well below the .05 threshold, and a 95% confidence interval for the mean difference that excludes zero [–5.860, –1.270], H_{03} is rejected. There is a statistically significant difference between the attitude of secondary school teachers towards Computer-Assisted Instruction and conventional teaching methods, with teachers showing a significantly more positive attitude towards conventional teaching methods ($M = 68.07$) than towards CAI ($M = 64.50$). The effect size (Cohen's $d = -0.305$) is small-to-medium, indicating that while the difference is statistically reliable, its practical magnitude is moderate rather than large — teachers are not starkly opposed to CAI, but they retain a measurable comparative preference for the conventional methods in which they were originally trained. This finding directly parallels Akbari's (2025) large-scale Iranian study, in which teachers and students alike continued to prefer face-to-face education over blended and e-learning modes despite holding positive attitudes towards the newer approaches, and is consistent with the experience-related attitude variation documented by Özgedik and Keskin (2023).

H_{04} : *There is no significant difference in the perceived effectiveness of Computer-Assisted Instruction and conventional teaching methods among secondary school teachers.*

Table 12 Group Statistics for Perceived Effectiveness of CAI and Conventional Teaching Methods

Group	N	Mean	Std. Deviation	Std. Error Mean
CAI (Perceived Effectiveness)	200	66.71	12.03	0.85
Conventional Teaching Methods	200	63.68	12.60	0.89

Mean Difference (CAI – Conventional) = 3.030.

Source: Author's field survey data (two independent groups, $N = 200$ each).

Interpretation: Reversing the direction observed for attitude, teachers rate CAI as, on average, 3.030 points more effective than conventional teaching methods. This is the pivotal finding of the study in relation to Objective O₄, revealing a divergence between the attitude construct (favouring conventional methods) and the perceived-effectiveness construct (favouring CAI) within the same sample of teachers.

Table 13 *Test of Homogeneity of Variances (Levene's Test) — Perceived Effectiveness Comparison*

F	Sig. (p)
0.819	0.366

Source: Author's field survey data (N = 400 combined).

Interpretation: Levene's test is again not significant ($p = .366 > .05$), confirming equal variances between groups and validating use of the 'Equal variances assumed' t-test statistic reported in Table 14.

Table 14 *Independent-Samples t-test — Perceived Effectiveness of CAI versus Conventional Teaching Methods*

t	df	Sig. (2-tailed)	Mean Diff.	SE Diff.	95% CI
2.460	398	0.014	3.030	1.231	[0.616, 5.444]

Effect Size: Cohen's $d = 0.246$ (small effect).

Interpretation: With $p = .014$ and a 95% confidence interval excluding zero [0.616, 5.444], H_{04} is rejected. There is a statistically significant difference in the perceived effectiveness of Computer-Assisted Instruction and conventional teaching methods among secondary school teachers, with teachers perceiving CAI as significantly more effective ($M = 66.71$) than conventional teaching methods ($M = 63.68$), albeit with a small effect size ($d = 0.246$). Read jointly with the H_{03} result, this constitutes the study's central substantive contribution: an attitude-effectiveness paradox in which the same teachers who feel more comfortable with, and attitudinally favour, conventional teaching nonetheless judge CAI to be the more instructionally effective approach. Within the Integrated Conceptual Model, this indicates that the affective/behavioural-comfort component of attitude and the cognitive/evaluative-effectiveness component are not fully aligned for CAI, implying that resistance to CAI adoption in these schools is more plausibly rooted in familiarity, confidence and infrastructural comfort than in a genuine belief that CAI is pedagogically inferior — a distinction with direct implications for the design of the policy interventions discussed in Section 6.

Major Findings

1. A large majority of secondary school teachers (69.0%) held a Moderate level of attitude towards Computer-Assisted Instruction, with comparatively small proportions falling in the Low (17.0%) and High (14.0%) categories (Table 1).
2. The distribution of attitude levels towards CAI departed significantly from a uniform distribution, $\chi^2(2, N = 200) = 114.760$, $p < .001$, leading to rejection of H_{01} (Table 4).
3. Similarly, a majority of teachers (70.5%) held a Moderate level of attitude towards conventional teaching methods, with 13.5% Low and 16.0% High (Table 5), and this distribution too departed significantly from uniformity, $\chi^2(2, N = 200) = 124.510$, $p < .001$, leading to rejection of H_{02} (Table 8).
4. Teachers displayed a significantly more positive attitude towards conventional teaching methods ($M = 68.07$, $SD = 12.10$) than towards Computer-Assisted Instruction ($M = 64.50$, $SD = 11.23$), $t(398) = -3.054$, $p = .002$, Cohen's $d = -0.305$ (small-to-medium effect), leading to rejection of H_{03} (Table 11).
5. Conversely, teachers perceived Computer-Assisted Instruction as significantly more effective ($M = 66.71$, $SD = 12.03$) than conventional teaching methods ($M = 63.68$, $SD = 12.60$), $t(398) = 2.460$, $p = .014$, Cohen's $d = 0.246$ (small effect), leading to rejection of H_{04} (Table 14).
6. Taken together, findings 4 and 5 reveal an attitude-effectiveness paradox: teachers' comparative comfort/preference favours conventional methods, while their evaluative judgment of instructional effectiveness favours CAI — indicating that the barrier to greater CAI adoption is more attitudinal/experiential than evaluative.
7. The regional pattern of moderate-to-positive computer/ICT attitude is consistent with prior West Bengal-based research (Pan, 2022; Setua & Yadav, 2024) and with the broader national and international literature reviewed in Section 2, suggesting that the findings are not an artefact of the specific sample but reflect a wider, replicable pattern in Indian and comparable international secondary-education contexts.

Conclusion

The present study examined the attitude of secondary school teachers of CBSE- and WBBSE-affiliated schools in South 24 Parganas district, West Bengal, towards Computer-Assisted Instruction in comparison with conventional teaching methods, and further compared the perceived effectiveness of the two approaches. All four null hypotheses were rejected: teachers' attitude towards both CAI and conventional methods was found to cluster significantly and non-uniformly around a Moderate level; teachers held a significantly more favourable attitude towards conventional teaching methods than towards CAI; and yet, teachers judged CAI to be significantly more effective than conventional teaching methods. This attitude-effectiveness paradox constitutes the study's most important substantive contribution, indicating that the primary obstacle to fuller CAI integration in

the study area is rooted in comfort, familiarity and possibly infrastructural constraint rather than in any genuine teacher conviction that CAI is pedagogically inferior.

These findings, situated within the Integrated Conceptual Model developed for this study and read alongside the reviewed international (Novković Cvetković et al., 2022; Özgedik & Keskin, 2023; Akbari, 2025) and national (Pan, 2022; Das et al., 2023; Setua & Yadav, 2024) literature, converge on a consistent picture: teacher attitude towards digital pedagogy in secondary education is generally moderate-to-positive rather than resistant, but a residual preference for conventional methods persists even where digital effectiveness is acknowledged. India's substantial policy and programmatic investment in digital education — through NEP 2020, PM eVIDYA, DIKSHA, NISHTHA, the Samagra Shiksha ICT component, SWAYAM, ITEP, NPST and NMM — provides a robust institutional scaffold for addressing this gap, provided that implementation is calibrated to teachers' actual attitudinal starting point rather than assuming uniform readiness. The recommendations offered in Section 7 are intended to translate this evidence base into concrete, region-specific action for the secondary schools of South 24 Parganas, and, by extension, to inform similarly situated districts elsewhere in India as NEP 2020's technology-integration vision continues to be operationalised.

Acknowledgment: No

Author's Contribution Dr. Md. Lutful Hoque: Data Collection, Literature Review, Methodology, Analysis, Drafting, Referencing

Funding: No

Declaration: The author/s has/have given consent for the publication.

Competing Interest: No

References

1. Akbari, E. (2025). A cross-sectional study of teachers' and students' preferences for educational methods in the post-COVID-19 era. *Frontiers in Education*, 10, Article 1564905. <https://doi.org/10.3389/feduc.2025.1564905>
2. Albirini, A. (2006). Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers. *Computers & Education*, 47(4), 373–398. <https://doi.org/10.1016/j.compedu.2005.06.013>
3. Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using Information and Communication Technology*, 8(1), 136–155.
4. Das, A., Chetia, J., & Goswamee, G. (2023). Attitude of teachers towards utilization of Information and Communication Technology (ICT) in secondary schools of Assam with special reference to Kamrup District. *Indian Journal of Educational Technology*, 5(2), 209–220.
5. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
6. Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Addison-Wesley.
7. Hariramani, S., & Narang, K. (2024). Evaluating educators' perspectives on NEP 2020. *International Journal of Management, Economics and Commerce*, 1(2), 75–83. <https://doi.org/10.62737/8qw4kd91>
8. Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, 55(3), 223–252. <https://doi.org/10.1007/s11423-006-9022-5>
9. Khatoon, T., & Sharma, R. (2011). *Computer attitude scale*. National Psychological Corporation.
10. Ministry of Education. (2024, December 2). *Upgradation of schools for NEP 2020* (Lok Sabha Unstarred Question No. 951). Government of India, Department of School Education & Literacy.
11. Ministry of Education. (2025, February 3). *Digital education schemes under NEP 2020* (Lok Sabha Unstarred Question No. 44). Government of India, Department of School Education & Literacy.
12. Ministry of Human Resource Development. (2020). *National Education Policy 2020*. Government of India. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
13. National Council of Educational Research and Training. (2022). *Use and integration of technology & digital education: Digital initiatives by NCERT* [Conference presentation]. Central Institute of Educational Technology, NCERT.
14. Novković Cvetković, B., Arsić, Z., & Cenić, D. (2022). Attitudes of teachers to using information and communication technology in teaching – Advantages and obstacles. *International Journal of Cognitive Research in Science, Engineering and Education*, 10(2), 69–76. <https://doi.org/10.23947/2334-8496-2022-10-2-69-76>
15. Özgedik, A., & Keskin, N. (2023). Investigation of technology and design teachers' attitudes towards computer aided education. *The Journal of International Social Research*, 16(98), 1–28. <https://doi.org/10.17719/jisr.2023.5609>
16. Pan, A. (2022). Attitude of school teachers towards the use of computers in Sundarban region of West Bengal. *Indian Journal of Educational Technology*, 4(2), 62–72.
17. Rathnabai, S. A. (2023). Developing competencies for technology-pedagogy integration among in-service teachers: Reflections. *Indian Journal of Educational Technology*, 5(2), 179–190.
18. Setua, C., & Yadav, M. (2024). Relationship between attitude towards ICT and techno-pedagogical skills of rural secondary school teachers of West Bengal Board. *Indian Journal of Educational Technology*, 6(1), 102–115.

Publisher's Note

The Social Science Review A Multidisciplinary Journal remains neutral with regard to jurisdictional claims in published data, map and institutional affiliations.

©The Author(s) 2026. Open Access.

This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>