From Policy to Practice: Teachers' Attitudes toward ICT Integration in Ghanaian Basic Schools

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ABSTRACT

This study investigated teachers' attitudes toward the integration of Information and Communication Technology (ICT) in lesson delivery in basic schools in the Central Region of Ghana. Despite increasing global advocacy for ICT in education, the extent to which basic school teachers adopt and use ICT tools remains uneven. A quantitative research design was employed, using a structured questionnaire administered to 300 teachers selected through stratified random sampling. Data were analyzed with the Statistical Package for the Social Sciences (SPSS), and the reliability of the instrument was confirmed with Cronbach's alpha values above 0.90 across all sections.

The results revealed that teachers generally held positive attitudes toward ICT integration in teaching and learning, although their responses often reflected moderate neutrality. Further analysis showed that demographic and professional characteristics such as gender, age, teaching experience, and educational qualification did not significantly influence teachers' attitudes toward ICT use. However, several barriers particularly inadequate infrastructure, limited access to ICT resources, and lack of continuous professional training were consistently identified as challenges to effective ICT integration.

The findings underscore the need for ongoing professional development programs, equitable resource distribution, and policy interventions to address contextual challenges faced by teachers. Strengthening ICT capacity in basic schools is critical to enhancing teaching quality and improving learning outcomes in Ghana.

Keywords: ICT integration, teachers' attitudes, basic schools, Central Region, Ghana, quantitative study.

INTRODUCTION

The integration of Information and Communication Technology (ICT) in education is widely recognised as a means of enhancing teaching, learning, and access to knowledge in the 21st century. Global initiatives, such as those promoted by UNESCO, underscore ICT as a tool for improving equity and preparing learners for digital economies. In Sub-Saharan Africa, however, ICT adoption remains uneven due to infrastructure deficits, inadequate training, and systemic challenges (Constancio, 2024; Mukuni, 2019).

In Ghana, ICT has been prioritised in educational reform. The Ministry of Education's ICT in (Ministry of Education, 2015) provides a framework for embedding ICT into pedagogy, strengthening teachers' competencies, and ensuring equitable access. National initiatives, including the establishment of computer laboratories, provision of ICT resources through the Ghana Investment Fund for Electronic Communications (GIFEC), and teacher training workshops, highlight the state's commitment to technology integration (Adarkwah, 2021). At the basic school level, ICT has been incorporated into the curriculum to promote early digital literacy.

Nonetheless, effective ICT use in classrooms remains inconsistent. Teachers acknowledge ICT's benefits, yet adoption is constrained by infrastructural challenges, unreliable electricity, and limited professional development opportunities, particularly in rural schools (Arkorful et al., 2021; Buabeng-Andoh, 2012). Since teachers'

attitudes strongly influence whether ICT resources are adopted, their perceptions are critical to the success of integration efforts (Gyamfi, 2017).

This study therefore investigates the attitudes of basic school teachers in Ghana's Central Region toward ICT integration in lesson delivery. It further examines how demographic and professional characteristics influence these attitudes, and explores the barriers teachers face in utilising ICT.

Background

Globally, the integration of Information and Communication Technology (ICT) into education is viewed as a catalyst for improving teaching quality, expanding access to knowledge, and equipping learners with the digital skills required for the 21st century (UNESCO, 2015). In Sub-Saharan Africa, many governments have adopted ICT-in-education policies, but implementation has often been constrained by infrastructural, financial, and capacity-related challenges (Constancio, 2024; Mukuni, 2019).

In Ghana, ICT has been placed at the centre of educational reform. The Ministry of Education's ICT in Education Policy (Ministry of Education, 2015) outlines strategies to integrate ICT into pedagogy, enhance teacher competencies, and ensure equitable student access. Interventions such as the distribution of ICT equipment through the Ghana Investment Fund for Electronic Communications (GIFEC), the establishment of computer laboratories, and teacher training workshops demonstrate strong policy commitment (Adarkwah, 2021). At the basic school level, ICT is a compulsory subject intended to foster digital literacy from an early stage.

Despite these initiatives, ICT integration in Ghanaian classrooms remains uneven. Teachers generally acknowledge ICT's pedagogical benefits, but actual usage is limited by barriers such as inadequate infrastructure, unreliable electricity, poor internet connectivity, and insufficient professional development (Arkorful et al., 2021; Buabeng-Andoh, 2012). These constraints are especially pronounced in rural and peri-urban schools, where disparities in resources and training opportunities create unequal conditions for ICT adoption (Effah et al., 2023; Natia & Al-hassan, 2015).

The Central Region provides a useful lens for examining these dynamics. As one of Ghana's educational hubs, the region hosts several Colleges of Education and a diverse mix of urban, peri-urban, and rural basic schools. However, access to ICT infrastructure and training opportunities varies widely across districts. Urban schools are relatively better resourced, while rural schools often struggle with persistent infrastructural deficits. Such disparities raise questions about how teachers' attitudes toward ICT are shaped in different contexts within the same region.

Since teachers' attitudes strongly influence their willingness to integrate technology into lesson delivery, investigating these perspectives is critical. Positive attitudes are associated with creativity, adoption, and enhanced learner engagement (Gyamfi, 2017), whereas negative attitudes or low confidence can limit ICT use even when resources are available. This study therefore situates itself within the Central Region of Ghana to examine teachers' attitudes, the demographic and professional factors that influence them, and the barriers that continue to affect effective ICT integration in basic schools.

LITERATURE REVIEW

Attitudes of Basic School Teachers Toward ICT Integration

Research consistently shows that teachers in Ghana and across Sub-Saharan Africa generally hold positive perceptions of ICT as a tool for enhancing teaching and learning. (Buabeng-Andoh, 2012) reported that teachers recognised ICT's usefulness in lesson preparation and learner motivation. Similarly, (Gyamfi, 2017) found that pre-service teachers expressed favourable attitudes toward ICT use, particularly for its role in improving teaching outcomes. However, several studies have highlighted a gap between attitudes and classroom practice. (Arkorful et al., 2021) observed that although teachers valued ICT, integration was often limited to administrative support or basic presentation rather than interactive pedagogy. (Adarkwah, 2021) further noted that while teachers endorse ICT in principle, infrastructural and curricular constraints reduce enthusiasm for its consistent use. These

findings suggest that attitudes are broadly positive but may not always translate into meaningful adoption in classroom delivery.

Influence of Demographic and Professional Characteristics

Teachers' demographic and professional characteristics are widely examined as determinants of ICT adoption. Training emerges as the strongest predictor, with studies showing that teachers who undergo ICT-focused professional development express greater confidence and more positive attitudes toward integration (Buabeng-Andoh, 2012; Gyamfi, 2017). Findings on age and teaching experience are less consistent. Some research suggests younger teachers are more confident in ICT use, but other studies indicate that with adequate training, age-related differences diminish significantly. Gender effects are similarly mixed: while minor disparities in ICT confidence have been observed, they tend to disappear once access and training are controlled for. Contextual factors such as school location also play a role, with urban teachers more likely to integrate ICT due to better access to infrastructure and clearer curricular alignment (Arkorful et al., 2021).

Barriers to ICT Integration in Lesson Delivery

Despite policy initiatives, barriers remain central to the ICT integration discourse. Infrastructural challenges including inadequate hardware, unreliable electricity, and poor internet connectivity are frequently cited as major constraints (Arkorful et al., 2021; Buabeng-Andoh, 2012). Teacher training is another critical issue: (Gyamfi, 2017) emphasises that short workshops are insufficient, advocating instead for sustained professional development embedded in teachers' practice. Leadership support and access to technical assistance also influence ICT use, with schools that provide encouragement and resources demonstrating higher levels of integration. Curriculum pressures further complicate adoption, as many teachers perceive ICT as an added burden within an already dense syllabus (Adarkwah, 2021). In rural districts of Ghana, these challenges are particularly acute, limiting teachers' ability to move from positive attitudes to consistent practice (Effah et al., 2023; Natia & Al-hassan, 2015).

Synthesis

Overall, the literature shows that while teachers generally value ICT, integration in Ghana remains constrained by structural and contextual barriers. Training and competence are key determinants of positive attitudes, but infrastructural challenges, leadership support, and curriculum alignment significantly mediate actual usage. Existing studies have focused heavily on pre-service or senior high school teachers, leaving limited evidence on basic school teachers in regional contexts. This gap underscores the importance of examining ICT integration in Ghana's Central Region, where disparities between urban and rural schools may shape teacher attitudes and practices in distinctive ways.

METHODOLOGY

Research Design

This study adopted a **quantitative descriptive survey design** to investigate teachers' attitudes toward the integration of ICT in lesson delivery in basic schools in Ghana's Central Region. The design was appropriate because it enabled the collection of standardized data from a large number of respondents, allowing for statistical analysis of patterns in attitudes, demographic influences, and perceived barriers. Surveys are particularly useful in studies of attitudes and practices, as they facilitate the examination of relationships among variables across diverse teacher populations (Creswell & Poth, 2018).

Population and Sampling

The target population comprised all public basic school teachers in the Central Region of Ghana. According to the Ghana Education Service (Service, 2022; Torgbe, 2023), the region has over 20,000 teachers distributed across urban, peri-urban, and rural districts.

A **multistage sampling strategy** was used, **Stratified sampling** ensured proportional representation of teachers from urban and rural districts and **Simple random sampling** was employed within selected schools to identify teacher participants.

The sample size was determined using (Krejcie & Morgan, 1970) sample size table, which recommends 377 respondents for a population of 20,000. To mitigate the impact of potential non-response, the target sample was increased to 400 teachers. Ultimately, **300 valid responses** were obtained and analysed, representing a 75% response rate.

Research Instrument

Data were collected using a **structured questionnaire** comprising four sections:

Section A: Demographic Information – age, gender, teaching experience, qualification, subject taught, school location (urban/rural), and ICT training background. **Section B: Teachers' Attitudes Toward ICT** – 13 Likert-scale items adapted from the Technology Acceptance Model (Davis, 1989), assessing perceived usefulness, ease of use, and behavioural intentions. **Section C: ICT Integration Practices** – 17 items measuring the frequency and types of ICT tools used in lesson preparation and delivery (e.g., presentation software, online resources, digital applications). **Section D: Barriers to ICT Integration** – 20 items capturing infrastructural, professional, and systemic challenges such as lack of devices, unreliable electricity, workload pressures, and inadequate training.

Items were rated on a five-point Likert scale ranging from 1 (**Strongly Disagree**) to 5 (**Strongly Agree**).

Validity and Reliability

The questionnaire was reviewed by experts in educational technology to establish **content validity** and piloted with a group of 30 teachers outside the study sample. Minor revisions to item wording and structure were informed by feedback. Internal consistency reliability was assessed using Cronbach's alpha, with coefficients ranging from 0.90 to 0.95 across the three main sections exceeding the threshold for excellent reliability as defined by (Nunnally, 1978).

Data Collection Procedure

Permission to conduct the study was obtained from the Ghana Education Service (GES) and relevant district education offices. With the cooperation of headteachers, questionnaires were distributed to teachers during school hours. Participation was voluntary, informed consent was obtained, and confidentiality was assured. Completed questionnaires were collected on-site to maximize the response rate.

Data Analysis

Data were coded and analysed using **SPSS (version 25)**. The following statistical techniques were applied: **Descriptive statistics** (frequencies, percentages, means, standard deviations) to summarise teachers' attitudes, demographic characteristics, and perceived barriers, **Multiple regression analysis** to determine the influence of demographic and professional characteristics on teachers' attitudes (Research Question 2) and **One-way ANOVA** to test differences in perceived barriers across groups with different years of teaching experience (Research Question 3). Results were presented in tables and figures for clarity, with significance levels set at $\mathbf{p < 0.05}$.

RESULTS

This section presents findings from the analysis of data collected from 300 basic school teachers in the Central Region of Ghana. Results are organised around the three research questions guiding the study.

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Research Question 1:

What are the attitudes of basic school teachers in the Central Region of Ghana toward the integration of ICT in lesson delivery?

Table 1 summarises teachers' responses to the attitude items.

Table 1: Teachers' Attitudes Toward ICT Integration (N = 300)

Item	SD	D	N	A	SA
ICT makes lesson delivery more interesting.	–	21 (7.0%)	148 (49.3%)	125 (41.7%)	6 (2.0%)
I feel confident using ICT tools in teaching.	–	22 (7.3%)	151 (50.3%)	119 (39.7%)	8 (2.7%)
ICT improves students' understanding of concepts.	–	24 (8.0%)	156 (52.0%)	110 (36.7%)	10 (3.3%)
I enjoy using ICT in my lessons.	–	23 (7.7%)	144 (48.0%)	128 (42.7%)	5 (1.7%)
ICT makes my work as a teacher easier.	1 (0.3%)	17 (5.7%)	150 (50.0%)	122 (40.7%)	10 (3.3%)
Students are more engaged when ICT is used.	–	24 (8.0%)	143 (47.7%)	121 (40.3%)	12 (4.0%)
My overall attitude toward ICT in education is positive.	–	16 (5.3%)	155 (51.7%)	115 (38.3%)	14 (4.7%)

Source: Field data, 2025, N= 300

Interpretation

Overall, teachers expressed **favourable attitudes** toward ICT integration. Between 40–45% of respondents agreed or strongly agreed with most items, while only 5–8% disagreed. However, neutrality dominated across many items, suggesting a degree of uncertainty or limited confidence in ICT use. For instance, while 43% agreed that ICT improved their effectiveness, 50% remained neutral. This indicates that although teachers recognise ICT's potential, practical experiences of its benefits are inconsistent.

Research Question 2:

To what extent do teachers' demographic and professional characteristics (e.g., age, sex, teaching experience, ICT training) influence their attitudes toward ICT integration?

Table 2: Regression Model Summary

Model	R	R^2	Adjusted R^2	Std. Error
1	.072	.005	–.005	6.15461

Source: Field data, 2025, N= 300

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Table 3: Regression ANOVA

Source	SS	df	MS	F	Sig.
Regression	57.844	3	19.281	0.509	.676
Residual	11,212.236	296	37.879		
Total	11,270.080	299			

Source: Field data, 2025, N= 300

Table 4: Regression Coefficients

Predictor	B	Std. Error	Beta	t	Sig.
Constant	43.946	1.502	—	29.256	.000***
Age	0.344	0.390	0.051	0.883	.378
Highest Qualification	–0.336	0.418	–0.047	–0.803	.423
Teaching Experience	0.032	0.361	0.005	0.088	.930

Source: Field data, 2025, N= 300

Interpretation

The regression analysis indicated that **teachers' demographic factors (age, qualification, experience) did not significantly predict their attitudes toward ICT integration** ($p > .05$). The model explained only 0.5% of the variance. This suggests that attitudes are shaped more by contextual and institutional factors than by personal demographics.

Research Question 3:

Is there a difference in perceived ICT integration barriers among teachers with different years of teaching experience?

Table 5: One-Way ANOVA

Source	SS	df	MS	F	Sig.
Between Groups	225.359	3	75.120	0.996	.395
Within Groups	22,318.307	296	75.400		
Total	22,543.667	299			

Source: Field data, 2025, N= 300

Interpretation

The ANOVA revealed no statistically significant differences in perceived ICT barriers across teaching experience groups ($F(3,296) = 0.996$, $p = .395$). The means plot (Figure X) confirmed that barrier scores were

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relatively similar across groups, suggesting that infrastructural and systemic challenges are **experienced uniformly**, regardless of teaching experience.

DISCUSSION

This study examined teachers' attitudes toward ICT integration in lesson delivery in basic schools within Ghana's Central Region, with attention to demographic influences and perceived barriers. The findings provide useful insights into both the promise and the challenges of ICT integration at the basic school level.

Teachers' Attitudes Toward ICT Integration

The results revealed generally favourable attitudes among teachers, with most respondents agreeing that ICT improves lesson delivery, enhances student engagement, and makes teaching more efficient. These findings are consistent with earlier studies by (Buabeng-Andoh, 2012) and (Gyamfi, 2017), who observed similarly positive perceptions among Ghanaian teachers. However, the high proportion of neutral responses in the present study suggests a level of uncertainty, reflecting limited opportunities for consistent ICT use in actual classroom practice. This echoes (Arkorful et al., 2021), who noted that positive perceptions do not always translate into active integration, often due to contextual barriers.

Demographic and Professional Influences

Contrary to expectations, demographic variables such as age, qualification, and teaching experience did not significantly predict teachers' attitudes. This aligns with findings from (Gyamfi, 2017), who argued that with adequate training, demographic differences lose their explanatory power in ICT adoption. The results also support (Adarkwah, 2021) assertion that systemic and institutional factors play a greater role than individual teacher characteristics in shaping ICT practices. Thus, while demographic diversity exists among teachers, attitudes toward ICT integration appear to be largely uniform across groups.

Barriers to ICT Integration

Perceived barriers were reported consistently across all teaching experience groups, with no significant differences detected. This suggests that challenges such as limited infrastructure, unreliable electricity, insufficient training, and curriculum pressures are experienced broadly, irrespective of years of service. These findings reinforce earlier studies by (Natia and Al-hassan, 2015) and (Effah et al. 2023), who observed that infrastructural constraints cut across school contexts in Ghana. The uniformity of these barriers highlights the systemic nature of the challenges, underscoring the need for structural reforms rather than teacher-specific interventions.

Implications

Taken together, the results suggest that positive attitudes among teachers are not enough to guarantee successful ICT integration. While teachers are willing to embrace technology, their ability to do so effectively is curtailed by structural and institutional limitations. These findings support (UNESCO, 2015) broader argument that ICT in education requires not only teacher readiness but also enabling conditions such as infrastructure, leadership, and policy support. In the Central Region, where disparities between urban and rural schools are evident, addressing systemic barriers is particularly critical to ensure equitable ICT adoption across contexts.

CONCLUSION

This study investigated teachers' attitudes toward ICT integration in lesson delivery in basic schools in Ghana's Central Region. The findings revealed that teachers generally hold favourable attitudes toward ICT, recognising its potential to make lessons more engaging, improve student understanding, and enhance teaching efficiency. However, many teachers reported neutral positions on specific items, suggesting that positive perceptions are not always matched by practical application in the classroom.

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The study further established that demographic and professional characteristics such as age, qualification, and teaching experience did not significantly influence teachers' attitudes. This indicates that willingness to integrate ICT is broadly shared across teacher groups, reinforcing the argument that contextual and systemic conditions, rather than personal attributes, are the primary determinants of ICT use.

Finally, perceived barriers such as inadequate infrastructure, unreliable electricity, limited professional development, and curriculum constraints were experienced uniformly across teachers, regardless of teaching experience. These systemic challenges continue to limit the extent to which ICT can be meaningfully integrated into lesson delivery.

In conclusion, while teachers in the Central Region are open and positive toward ICT adoption, the success of integration efforts depends largely on addressing structural barriers. For ICT to become a transformative tool in basic education, investment in infrastructure, consistent teacher training, and stronger institutional support are essential.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed for policymakers, educational authorities, and school leaders to enhance the integration of ICT in basic schools in the Central Region of Ghana:

Strengthen ICT Infrastructure

The government, through the Ministry of Education and the Ghana Education Service (GES), should prioritise the provision of reliable ICT infrastructure, including functional computer laboratories, internet access, and stable electricity supply, particularly in rural and peri-urban schools where deficits are greatest.

Expand Continuous Professional Development

Teacher training in ICT should move beyond short-term workshops to sustained, practice-oriented professional development. Colleges of Education and district training centres should provide regular in-service training focused on pedagogical, rather than purely technical, applications of ICT.

Embed ICT into Curriculum Delivery

Curriculum planners should integrate ICT use into subject-specific teaching strategies rather than treating it as an additional or stand-alone subject. This would help teachers view ICT as a core teaching tool rather than an extra burden.

Enhance Technical and Administrative Support

Schools should establish ICT support systems, such as assigning ICT coordinators or technicians, to assist teachers with troubleshooting and integration challenges. Leadership at the school level should also encourage and incentivise ICT use in classrooms.

Address Equity Gaps

Efforts should be made to reduce the disparity between urban and rural schools. Targeted interventions, such as prioritising rural schools in ICT resource allocation and infrastructure projects, are necessary to promote equity in access and usage.

Monitor and Evaluate ICT Integration

The GES should institute mechanisms for monitoring ICT integration in schools, including regular assessments of teachers' usage patterns, attitudes, and needs. Such evaluations will help inform ongoing policy and resource adjustments.

Abbreviations

ANOVA – Analysis of Variance

GES – Ghana Education Service

GIFEC – Ghana Investment Fund for Electronic Communications

ICT – Information and Communication Technology

SPSS – Statistical Package for the Social Sciences

UNESCO – United Nations Educational, Scientific and Cultural Organization

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