

Perceptions of Public Basic School Teachers Regarding the Integration of ICT Tools into Teaching and Learning in the Ga North Municipality of Ghana

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Abstract

This study employed a descriptive survey design to establish teachers' perceptions of integrating Information and Communication Technologies (ICTs) into teaching and learning in public basic schools in the Ga North Municipality of Ghana. The researchers adopted both simple random and cluster sampling approaches to select the respondents. Eighty-four (84) teachers responded to the questionnaire, and results were analysed quantitatively using both descriptive and inferential statistics. The study was guided by five research objectives, four research questions, and one hypothesis. The study revealed that the available ICT tools were limited to personal laptops/desktops with internet connectivity and handheld smart devices. Also, the majority of the teachers did not use most of these ICTs frequently because they lacked the pedagogical competence in their use. Lack of ICT infrastructure was the main barrier to their integration into instruction. The findings revealed a strong positive correlation between public basic school teachers' access to ICTs and the frequency of their use. The study recommended that education stakeholders support schools by providing well-equipped computer laboratories.

Key words: Perceptions, ICTs, Computer, Competence, Integration

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Introduction

Globally, technology innovation and its integration into other subject areas are becoming increasingly indispensable to any educational system. Even "farm hands" are not safe because people have invented an Artificial Intelligence (AI) machine that does the work of 30 people 24/7 by killing weeds and harvesting data, among other things, on the farm. The data, which the AI gathers from past actions, helps farmers make future projections. The technological revolution has replaced conventional work routines, and according to Lent (2018), people must be willing to learn new skills to remain relevant in their world of work. This is why scholars such as Hamilton (2018) and Suchita et al. (2023) argue that teachers must keep themselves abreast of the latest pedagogical strategies to successfully integrate technological tools into their classroom activities towards achieving their personal and institutional goals.

Australia is one of the countries that has made significant progress in incorporating ICTs into its education system over the last two decades (Thompson, 2015). The Australian national policies also stressed the need to promote teaching and learning with technology at the beginning of the 21st Century, as captured in the Melbourne Declaration and the Educational Goals for Young Australians (Thompson, 2015). Effective ICT integration requires a pedagogical approach that incorporates technology to enhance teaching and learning (Eden, Chisom & Adeniyi, 2024; UNESCO, 2023).

The Government of Ghana (GOG) has supported increased use of technology in classrooms (Abedi, 2024), but effective integration remains a challenge (Adarkwah, 2021; Ntumi & Bulala, 2025). Many schools in Ghana lack ICT infrastructure and resources (Agyemang & Amoako, 2015). Teachers struggle to implement ICTs smoothly due to limited knowledge and skills (Agyei & Voogt, 2011; Kwande et al., 2017). Ghana has made efforts to enhance ICT in education and training programs for teachers, including localisation of the UNESCO ICT Competency framework and the Emergency Remote Teaching (ERT) course (Antoninis et al., 2023). These efforts demonstrate Ghana's commitment to enhancing ICT in education and providing teachers with the necessary skills to effectively integrate technology into their teaching practices. Around the world, school administrators cite inequalities in access to reliable internet, electricity, and technology training, and approximately 70% say their schools lack sufficient devices for their students (Global School Leaders, 2024). Champa et al. (2019) found that teachers face barriers to integrating ICT into teaching. These challenges inhibit the effective use of ICT in the classroom and undermine the potential for meaningful learning experiences. The researchers' preliminary investigations revealed that some of the public basic schools lacked permanent ICT infrastructure.

Despite the government's efforts to equip teachers with laptops through the Ministry of Education and Teacher Unions, many teachers, including those in Accra, continue to rely on traditional teaching methods. Star News (2023) report confirmed that "*Teachers say months after paying for the said laptops, some are yet to receive their machines. They say the government's silence on the matter is deafening.*" Given these challenges, this study seeks to explore teachers' perceptions of

the availability of these ICTs in their schools and how often this public basic school teachers use the ICT tools available to them during teaching and learning.

The Ministry of Education (MOE) and the Ministry of Communication (MOC) have organised training programmes to equip educators with essential ICT skills, including basic digital skills, coding and programming, Microsoft Office applications, and online teaching and learning platforms (Futukpor, 2023). However, these programs were rolled out only to some 100 teachers, selected from various districts across the Northern Region, and were not extended to all public basic schools in Ghana (Futukpor, 2023), creating a skills gap between teachers trained in other districts and those in the Ga North Municipality.

Again, several studies were conducted on similar topics in different parts of the country. There are three levels of education in Ghana, namely basic (primary and junior high schools), senior high/technical schools and tertiary education. Most previous studies on similar topics were conducted at the secondary and tertiary levels of education in Ghana. Therefore, this research is necessary to investigate the state of affairs regarding the chosen topic among selected public basic school teachers in the Ga North Municipality and to fill this gap. The paper was guided by the following research questions:

1. What ICT tools are available to public basic school teachers in the Ga North Municipality?
2. How often do public basic school teachers in Ga North Municipality make use of ICT in their lesson delivery?
3. What is the level of teacher competence in using ICT tools in teaching and learning in Ga North Municipality?
4. What are the challenges hindering teachers from effectively using ICT tools in the Ga North Municipality?

Literature Review

Theoretical Review

This study is grounded in the Technology Acceptance Model (TAM). TAM is a framework commonly used to explain and predict users' acceptance and use of technology. The model was introduced by Davis in 1989 and has been widely applied in various fields, including education. TAM postulates that perceived usefulness (PU) and perceived ease of use (PEOU) are the main determinants of users' acceptance of technology. PU refers to the degree to which a user believes that technology will enhance their performance, while PEOU suggests that a user's perception of the technology's ease of use is also crucial in determining their intention to use it (Davis, 1989; Nugroho, Dewanti & Novitasari, 2018; Lanlan, Ahmi & Popoola, 2019).

The availability of ICT tools influences teachers' perceived usefulness of the technology (Lanlan et al., 2019). For instance, if teachers have access to a wide range of ICT tools, they are more likely to perceive the technology as useful in enhancing their teaching and learning processes (Nugroho

et al., 2018). On the other hand, if the available ICT tools are limited, teachers may perceive the technology as less useful (Lanlan et al., 2019; Nugroho et al., 2018). The frequency of ICT use is an indicator of teachers' perceived usefulness of the technology (Cattaneo, Antonietti & Rauseo, 2025). Teachers who frequently use ICT in their teaching perceived the technology as more useful than those who rarely use it (Cattaneo et al., 2025). Teacher competence in using ICT tools affects both PU and PEOU (Baddar & Khan, 2023). A higher level of competence may increase teachers' PEOU, making them more likely to use the technology because they believe it is easy to use (Joo, Park & Lim, 2018). Additionally, teacher competence may enhance teachers' PU by making them aware of ways to use the technology to improve their job performance (Antonietti, Cattaneo, & Amenduni, 2022). Challenges such as limited access to ICT tools or inadequate training in using the technology influence teachers' PEOU and PU (Ke & Gong, 2025). Teachers who face significant challenges in using ICT perceived the technology as less useful or difficult to use (Bansa, 2020).

ICT Tools Available to Basic School Teachers in Ghana

Information and Communication Technology (ICT) include computers, the Internet, and electronic delivery systems such as radios, televisions, and projectors, among others, and is widely used in today's education field (Khan et al, 2012). There is steady growth in the successful application of ICT in instruction, learning, and assessment (Rizzo et al., 2011). A survey conducted by Bariu (2020) on the availability of computers, printers, cameras, scanners, photocopiers, and the Internet revealed that the majority of principals and teachers at the selected schools in Kenya reported that computers were unavailable in their schools.

Rutten, van Joolingen, and van der Veen (2012) found that computer simulations can be used to augment and improve traditional instruction. Mavellas, Wellington and Samuel (2015) revealed that most ICTs required for training are not available to all teachers and students, and those that are available are inadequate. ICT has also become integral to the teaching-learning interaction, through such approaches as replacing chalkboards with interactive digital whiteboards, using students' own smartphones or other devices for learning during class time, and the "flipped classroom" model, where students watch lectures at home on the computer and use classroom time for more interactive exercises (UNESCO, 2023).

Use of ICTs in Education

According to Antoninis et al. (2023), measuring ICT in education is therefore important to inform policymakers in setting national priorities and developing ICT in education policy. Condie and Munro (2007) found that the effective integration of ICT skills into teaching and learning positively impacted the learning process, as students benefited from ICT in many ways. Digital technology can provide students the opportunity to engage in virtual reality, where students can

explore from a virtual laboratory, conduct experiments and share ideas across countries (Potkonjak et al., 2016), without encountering the risks they would have had if they were learning such content in the “real” world (Rizzo et al., 2011). Mouza (2008) found that teachers’ access to digital tools, such as projectors, significantly predicts their technology integration practices.

Encourage Student-Centred and Self-Directed Learning

Self-managed learning enables students to be self-motivated and self-directed learners who can respond readily and efficiently to rapidly changing information (Alshare et al., 2011). The use of blogs, for instance, can help educators and students stay up to date on issues and discussions in the educational sector and other sectors, since we can access the internet anytime, anywhere.

Promote Collaborative Learning

Digital technology provides students with the opportunity to engage in “virtual reality,” where they can explore a virtual laboratory, conduct experiments, and share ideas across countries without encountering the risks they would face if learning such content in the “real” world (Rizzo et al., 2011). Self-managed learning enables students to be self-motivated and self-directed learners who can respond readily and efficiently to rapidly changing information (Alshare et al., 2011). The use of ICTs in education promotes student-teacher and student-student collaborative learning by enabling students to use digital tools for communication (Gertrude, 2015), both in their own classes and at other schools. For instance, web-based learning enhances student-teacher interaction, and ICTs improve the quality of teaching and learning.

Improve Teaching and Learning Quality

Davies and Birmingham (2002) identified three benefits of using the storyboard program software. These three kinds of benefits are cognitive, motivational, and interactional advantages. Effective use of ICTs would help in many areas in teaching and learning, such as facilitating and improving teaching and learning processes; providing for flexibility of lesson delivery; creativity, higher order of thinking ability; improving consistency and quality of instruction, both for formal and informal education, etc., especially through distance education.

Factors Influencing the Use of ICT in Schools

The external factors influencing the effectiveness of technology integration in schools include technology availability, accessibility of ICT equipment, time to plan for instruction, technical and administrative support, school curriculum, school climate and culture, faculty teaching load and management routine, and pressure to prepare students for national entrance exams (Al-Ruz & Khasawneh, 2011). Al-Ruz and Khasawneh (2011) found that some external factors were

positively associated with technology integration, including the availability of technology and support from technicians, teachers, and principals. Lee et al. (2013) found that teachers' access to digital resources, including online resources, was a significant predictor of their technology integration practices. Sipilä (2011) claims that teachers frequently use ICT for informative, organisational, and recreational purposes.

Teacher Competence in the Use of ICT

According to the OECD (2000), teachers must possess a range of technical and pedagogical skills that require continuous updating to keep pace with technological advances. Ghana's ICT in Education Policy (2008) aims to equip teachers with the necessary skills to integrate ICTs into their teaching practices. The policy's strategies include equipping teacher training colleges with creative and innovative ideas; basic training in ICT skills for Ghanaian teachers; ICT integration into the teaching and learning process at all levels of the educational system; and introduction of ICT as a teaching subject to promote ICT literacy among students (Gunu et al., 2022). Despite these efforts, challenges persist in effectively integrating ICTs into pre-tertiary schools in Ghana.

The Challenges to Teachers' Use of ICTs in Education

The challenges to teachers' use of ICTs in education include the following:

Inadequate ICT Tools and Infrastructure

Many schools lack sufficient computers, peripherals, and internet connectivity, hindering effective ICT integration (Agyemang & Amoako, 2015; Van-Ess, 2013). Resource constraints, including insufficient computers, limited network connectivity, and the absence of school-level ICT policies, impede ICT adoption (Gunu et al., 2022; Mafuraga & Moremi, 2017). Teacher-level barriers include insufficient time due to heavy workloads, low confidence, technological refusal stemming from negative perceptions, lack of belief in the potential benefits of ICT, and inadequate personal access to technological resources (Becta, 2004; Mafuraga & Moremi, 2017). Teachers can use ICT to extend students' learning beyond traditional limits, ensure their active participation in the teaching and learning process, and create essential environments for experimentation and exploration (Ajayi, 2008; Nwangwu, Obi & Ogwu, 2014).

Inadequate Technological Support for Teachers

A lack of technical support and maintenance (Becta, 2004) discourages teachers from adopting and integrating ICTs in classrooms (Korte & Husing, 2007). Owusu-Fordjour, Koomson, and Hanson (2020) also noted the lack of technical skills as one of the challenges facing teachers' ICT use in education in Ghana. Owusu-Fordjour et al. (2020) said that many teachers in Ghana lack the necessary competencies to use ICT effectively in their teaching. For example, teachers may not

know how to use software application tools, develop multimedia content, or integrate online resources into their lessons.

Workload on Teachers

Raman and Yamat (2014) found that teachers reported being overloaded with administrative tasks, such as preparing report cards, marking attendance registers (reports), and filling in the record book and form.

Limited Pedagogical Content Knowledge

Kwande et al. (2017) note that many teachers in Ghana lack the necessary knowledge and skills to integrate ICT into the curriculum. For instance, teachers may not have a deep understanding of how to structure ICT-integrated lessons, design ICT-integrated assessments, or evaluate students' learning outcomes when using ICT. This challenge inhibits the effective use of ICT in the classroom and undermines the potential for meaningful learning experiences. Lack of ICT training for teachers is also part of their inability to incorporate ICT in teaching and other subjects (Becta, 2004).

Methodology

Research paradigm, approach and design

The study adopted a descriptive survey design, underpinned by positivism and grounded in solid, objective facts independent of subjective interpretation. The quantitative research approach was used to collect data on the availability of ICTs, how frequently teachers utilised them, their ability to use these tools, and the challenges encountered in incorporating them. We aimed to find out from teachers how they perceived the incorporation of ICTs into teaching and learning. According to Park, Konge, and Artino Jr (2020), the positivist paradigm is based on the assumption that a single tangible reality exists, i.e., one that can be understood, identified, and measured. Positivists contend that knowledge can and must be developed objectively, without the values of the researchers or participants influencing its development (Park et al., 2020). Knowledge, when appropriately developed, is truth; that is, it is certain, congruent with reality, and accurate. With this design, we were able to gather data from a relatively large number of cases at a particular time, enabling us to make inferences and generalisations from the sample (McCombes, 2019).

Population, setting, sample, and sampling techniques

The target population consisted of all 115 teachers from four public basic schools in the Ga North Municipality, of whom 92 (80%) were selected using simple random sampling and cluster sampling techniques. Simple random sampling and cluster sampling techniques were used to ensure fairness in selecting respondents (Ahmed, 2024). A total of 89 questionnaires were

collected from the participants, indicating a 96.7% return rate. Of the 89 questionnaires received, 5 were excluded from the data analysis due to incompleteness. Thus, 84 questionnaires were used in the data analysis, indicating a 91.3% response rate. The sample size was determined using the sample size determination table (Kothari, 2004).

Research instrument, validity and reliability

The questionnaire was the main instrument used in this research. It was segmented into five parts: namely, the demographic data of the participants; the availability and accessibility of ICT facilities in the schools using a dichotomous scale; the proficiency level of teachers in ICT usage in their pedagogical practices; and the frequency of ICT utilisation patterns. The respondents answered questions on how often they used computers for professional work, as well as the hindrances in the application and use of ICT facilities.

During face validity, the instrument was developed and validated by the researchers through item-by-item discussions between the student and his dissertation supervisor. Some items deemed irrelevant were removed during face validity testing. The questionnaire was discussed with other subject-matter experts in the field of educational policy analysis, measurement and evaluation, among others, to ensure content validity. This was done to ensure that the instrument's content was relevant or sufficiently clear to measure the intended constructs. It was then that we ensured the repeatability of the results in a population with similar characteristics. We used a 95% confidence interval at an alpha level of 0.05 to calculate the level of consistency. Cronbach's Alpha coefficient of 0.903 was calculated to determine the reliability of the test items. There are different reports about the acceptable values of alpha, ranging from 0.70 to 0.95 (Tavakol & Dennick, 2011; George & Mallery, 2019), giving us a lot of confidence.

Data collection procedures

The questionnaires were delivered personally to the selected teachers after a written informed consent had been sought from the District Education Directorate and the selected schools. The questionnaires were collected from the teachers after one week. 89 questionnaires were retrieved from the respondents. Return rate = $(89/92)100 = 96.7\%$. Also, a total of 84 questionnaires out of 92 were completed by the respondents, so we used them for the data analysis; i.e., valid response rate = $(84/92) \times 100 = 91.3\%$.

Data analysis procedure

Data collected from the respondents were analysed descriptively and inferentially using the Statistical Package for the Social Sciences (SPSS) version 26. Additionally, frequencies, percentages, means, and standard deviations were used to analyse research questions 1 test the hypothesis. The results are presented in Tables 1-5 below.

To determine which ICT tools were available to the teachers, statements, called “items,” were generated and used to measure each participant’s level of agreement with each statement on a dichotomous scale, with 1 = Not Available (NA) and 2 = Yes (Available). Results are presented as frequencies and percentages in Tables 1a and 1b below.

Also, respondents were asked to indicate how often or frequently they access and use ten of the ICTs mentioned under objective one above. Thus, they rated how they frequently use those ICTs on a scale of 1 to 5, where 1 indicates “Never (N),” 2 indicates “Rarely (R) = At least twice per year,” 3 indicates “Sometimes (S) = At least twice a month,” 4 indicates “Often = at least twice a week,” and 5 indicates “Daily.” The results are presented in frequencies, percentages, mean, and standard deviation in Table 2 below.

Teachers were asked to rate their competence in using the ICT tools available to them on a five-point scale designed by the researcher, where 1 = Not Good/Poor (NG/P), 2 = Average (A), 3 = Good, 4 = Very Good (VG) and 5 = Excellent (E), for each item as shown in Table 3a and Table 3b below. Teachers were also asked to indicate their level of agreement with each item (perceived challenges preventing them from integrating ICTs into teaching and learning activities), as shown in Tables 4a and 4b below. In this regard, statements called “items” were generated and used to measure each teacher’s level of agreement with each statement on a five-point Likert scale, with 1 = strongly disagree (SD), 2 = disagree (D), 3 = neutral (N), 4 = agree (A) and 5 = strongly agree (SA), where 1 indicates the least agreement with the statement and 5 the strongest. Finally, a hypothesis was tested to make an inference from the data. Respondents rated themselves on a five-point Likert scale, with a mean of $(1+2+3+4+5)/5 = 15/5 = 3.0$. Therefore, a mean below 3.0 indicates respondents disagreed with a particular statement, while a mean above 3.0 indicates that the respondents agreed with the statement.

Results

This section of the paper provides a comprehensive overview of the results obtained from the respondents’ data. The findings are organised and presented in line with the specific objectives and research questions that guided the study. Each result will be analysed in detail to show how it addresses the research aims, offering insights and interpretations that enhance our understanding of the collected data. By systematically categorising the results, this section aims to clarify the connections between the data and the research’s overarching themes.

Availability of ICT tools to the pre-tertiary school teachers in the Ga North Municipality

Table 1: ICT Tools Available to Pre-Tertiary School Teachers in the Ga North Municipality

| Resources | Yes | | No | | Interpretation (Available/ Unavailable) |
|---|----------------|-------------------|----------------|--------------------|---|
| | Frequency N | Percentage (%) | Frequency N | Percentages (%) | |
| Personal laptop computer or desktop computer | 59 | 70.2 | 25 | 29.8 | Available |
| Radio set | 59 | 70.2 | 25 | 29.8 | Available |
| Able to book or arrange a computer lab for a lesson | 18 | 21.4 | 66 | 78.6 | Unavailable |
| Personal Projectors | 4 | 4.8 | 80 | 95.2 | Unavailable |
| Simulations or a virtual lab to the respondent | 4 | 4.8 | 80 | 95.2 | Unavailable |
| Reference software to respondents | 4 | 4.8 | 80 | 95.2 | Unavailable |
| Internet from the Classroom | 4 | 4.8 | 80 | 95.2 | Unavailable |
| Handheld Smart Devices such as a tablet | 55 | 65.5 | 29 | 34.5 | Available |
| Google Apps for Education | 25 | 29.8 | 59 | 70.2 | Unavailable |

These results are presented in descending order. The data suggest that the majority of teachers indicated that personal computers, such as laptops and desktops (N = 59, 70.2%), radio sets (N = 59, 70.2%), and internet-connected handheld smart devices, such as tablets or personal phones (N = 55, 65.5%), were available to them.

However, the majority of the teachers indicated that they were unable to book or arrange a computer lab in advance for instruction 18 (21.4%). Also, the majority of the teachers indicated that interactive whiteboards, personal projectors, simulations or virtual labs, internet access in the classroom, and Google Apps for lessons were unavailable to them.

Table 2: Descriptive Statistics of ICTs Available to Teachers

| Available ICT Resources | Yes | | No | | Interpretation (Available/ Unavailable) |
|---|----------------|-------------------|----------------|-------------------|---|
| | Frequency N | Percentage (%) | Frequency N | Percentage (%) | |
| School Computer laboratory with internet | 0 | 0 | 84 | 100.0 | Unavailable |
| E-assessment tools | 17 | 20.2 | 67 | 79.8 | Unavailable |
| Google Scholar Search Engines | 12 | 14.3 | 72 | 85.7 | Unavailable |
| Internet from the government | 9 | 10.7 | 75 | 89.3 | Unavailable |
| Internet Café | 8 | 9.5 | 76 | 90.5 | Unavailable |
| Internet from a personal home device | 33 | 39.3 | 51 | 60.7 | Unavailable |
| School Projectors | 33 | 39.3 | 51 | 60.7 | Unavailable |
| Television sets | 31 | 36.9 | 53 | 63.1 | Unavailable |

The data in Table 2 suggest that none of the schools visited had a computer laboratory [Yes = 0 (0), No = 84 (100%)]. This implies that the schools did not provide teachers with computers or internet connectivity to use. The data also show that the majority of the teachers indicated that E-assessment tools [Yes = 17 (20.2%), No = 67 (79.8%)]; Google Scholar search engines [Yes = 12 (14.3), No = 72 (85.7%)]; Internet supplied by the Government to their Schools [Yes = 9 (10.7%), No = 75 (89.23)]; Internet Café [Yes = 8 (9.5%), No = 76 (90.5%)]; school projectors [Yes = 33 (39.3%), No = 51 (60.7%)]; were unavailable to them.

Frequency of Access and Usage of ICTs in Teaching and Learning Resources by the pre-tertiary teachers in Ga North Municipality

Table 3: Frequency of Access and Usage of ICTs in Teaching and Learning

| Statement | Mean | Std. Deviation | Interpretation |
|---------------------------------------|--------|----------------|----------------|
| Computer (Laptop & Desktop) | 1.1071 | .51526 | Never |
| Projectors | 1.1667 | .59785 | Never |
| Free subscription to online resources | 1.4881 | .89838 | Never |
| Simulations (Virtual Lab) | 1.3929 | .77643 | Never |
| Reference software | 1.1190 | .42241 | Never |
| E-assessment tools | 1.5357 | .97494 | Never |
| Google Apps for Education | 2.8929 | 1.37987 | Rarely |
| Hand-held Smart devices (Tablet) | 3.5119 | 1.3927 | Daily |
| Interactive whiteboards | 1.9405 | 1.29272 | Rarely |
| e- textbooks | 1.7857 | 1.24253 | Rarely |
| Internet | 3.8810 | 1.34795 | Often |

Key: M = Mean, SD = Std. Deviation, Mean of Means Score = 1.984 → Rarely (R), Means of Standard Deviations score = 0.986; Never = 1.01 – 1.75; Rarely = 1.76 – 2.50; Sometimes = 2.51 – 3.75; and Often = 3.76 – 4.00

Respondents rated themselves on a five-point Likert scale, with a mean of $(1+2+3+4+5)/5 = 15/5 = 3.0$. Therefore, a mean below 3.0 indicates that respondents disagreed with the statement, while a mean above 3.0 indicates that respondents agreed with it. From the data in Table 2, the majority of respondents indicated that they never or rarely integrated ICTs such as laptop computers or desktop computers owned by the school; projectors in their lesson delivery; free subscriptions to online resources; simulations/virtual labs; reference software; e-assessment tools; Google Apps for Education; interactive whiteboards; electronic textbooks; and ICTs to type their lesson notes.

Level of Teacher Competence in the Use of ICT Tools in Teaching and Learning

Table 4: Teacher Competence in the Use of ICTs in Teaching and Learning

| Item | NG | A | G | VG | E | Interpretation |
|---|-----------|-----------|-----------|-----------|-----------|----------------|
| | N (%) | N (%) | N (%) | N (%) | N (%) | |
| I use my personal computer to type my lesson notes | 56 (66.7) | 12 (14.3) | 6 (7.1) | 7 (8.3) | 3 (3.6) | Not Good |
| I use a word processor to type lesson notes and any other document that concerns my work | 46 (54.8) | 9 (10.7) | 7 (8.3) | 9 (10.7) | 13 (15.5) | Not Good |
| I use ICTs, e.g., smartphones/hand-held devices, to search for info online without assistance | 12 (14.3) | 5 (6.0) | 21 (25.0) | 12 (14.3) | 34 (40.5) | Excellent |
| I use ICTs, e.g., radio and TV, in teaching and learning | 11 (13.1) | 12 (14.3) | 15 (17.9) | 9 (10.7) | 37 (44.0) | Excellent |
| I use ICTs to prepare students' records | 69 (82.1) | 9 (10.7) | 3 (3.6) | 1 (1.2) | 2 (2.4) | Not Good |

Key: NG = Not Good, A = Average, G = Good, VG = Very Good, and E = Excellent

Table 3 presents teachers' ratings of self-competence in using ICTs for teaching and learning. The data suggest that the majority of the teachers rated themselves "Not Good" (poor) on the use of a word processor to type lesson notes and any other document that concerns their work; use of ICTs to prepare students' records; as well as use of radio and TV in teaching and learning. However, the majority of them rated themselves from average (A) to excellent (E) in their ability to use ICTs to search/browse for information on the web using either their smartphones/handheld devices or computers without assistance.

Table 5: Teacher Competence in the Use of ICTS in Teaching and Learning

| Item | NG | A | G | VG | E | Interpretation |
|---|-----------|-----------|-----------|---------|---------|----------------|
| | N (%) | N (%) | N (%) | N (%) | N (%) | |
| I use e-assessment tools, e.g., Excel, to assess students | 65 (77.3) | 10 (11.9) | 4 (4.8) | 2 (2.4) | 3 (3.6) | Not Good |
| I use email for personal communication | 57 (67.9) | 8 (9.5) | 6 (7.1) | 7 (8.3) | 6 (7.1) | Not Good |
| I can store and retrieve information on and from the computer | 64 (76.2) | 7 (8.3) | 5 (6.0) | 5 (6.0) | 3 (3.6) | Not Good |
| Rate your pedagogical skills in ICT | 63 (75.0) | 11 (13.1) | 3 (3.6) | 3 (3.6) | 4 (4.8) | Not Good |
| Microsoft PowerPoint for presentations in class and seminars | 52 (61.9) | 13 (15.5) | 10 (11.9) | 5 (6.0) | 4 (4.8) | Not Good |
| I use a computer to do desktop publishing | 57 (67.9) | 13 (15.5) | 6 (7.1) | 4 (4.8) | 4 (4.8) | Not Good |
| I use subject-based instructional software | 56 (66.7) | 8 (9.5) | 5 (6.0) | 7 (8.3) | 8 (9.5) | Not Good |

Key: NG = Not Good, A = Average, G = Good, VG = Very Good, and E = Excellent

The majority of teachers rated themselves as poor (P) on all items listed in Table 10b. Teachers rated themselves poorly on their ability to use: E-Assessment tools, e.g., Excel, to assess students; Email for personal communication; store information on the computer/other devices; pedagogical skills in ICT; Microsoft PowerPoint for presentations in class and seminars; a computer for desktop publishing; subject-based instructional software.

Challenges Hinder Basic School Teachers from Using ICT Tools in Ga North Municipality

Table 6: Barriers/Challenges to ICT Integration in the Schools

| Statement | SD | D | N | A | SA | Mean (Std. Dev.) |
|---|---------|-----------|-----------|-----------|-----------|------------------|
| | N (%) | N (%) | N (%) | N (%) | N (%) | |
| Inadequate computers | 2 (2.3) | 5 (6.0) | 0 | 20 (23.8) | 57 (67.9) | 4.48 (.95) |
| Lack of a school computer lab | 5 (6.0) | 8 (9.5) | 6 (7.1) | 30 (35.7) | 35 (41.7) | 3.97 (1.19) |
| Teacher works over-load | 2 (2.3) | 15 (17.9) | 18 (21.4) | 24 (28.6) | 25 (29.8) | 3.65 (1.16) |
| Lack of a power source (electricity) in the classrooms | 7 (8.3) | 14 (16.7) | 5 (6.0) | 28 (33.3) | 30 (35.7) | 3.71 (1.30) |
| Inadequate periods to use technology to teach curriculum content. | 4 (4.8) | 10 (11.9) | 8 (9.5) | 43 (51.2) | 19 (22.6) | 3.75 (1.09) |
| Inability to cope with ICT/computer complexities | 3 (3.6) | 13 (15.5) | 11 (13.1) | 27 (32.1) | 30 (35.7) | 3.81 (1.19) |

Key: M = Mean, SD = Std. Deviation, Mean of Means Score = 3.899 Strongly Agree (SA), Means of Standard Deviations score = 1.147; SD = Strongly Disagree (1.01 – 1.75), D = Disagree 1.76 – 2.50), A = Agree (2.51 – 3.75, and SA = Strongly Agree (3.76 – 4.00)

The data in Table 6 show that majority of the teachers strongly agree (SA) or are in agreement (A) that there were inadequate computers; lack of school computer lab; lack of school Computer lab; too much workload on teachers; lack of power source (electricity) in the classrooms; inadequate periods to use technology to teach curriculum content (Time Constraint); and inability to cope with ICT/computer complexities.

Table 7: Barriers/Challenges to ICT Integration in Schools

| Statement | SD | D | N | A | SA | Mean |
|---|-----------|-----------|---------|-----------|-----------|---------------|
| | N (%) | N (%) | N (%) | N (%) | N (%) | (Std. Dev.) |
| Inadequate technological support for teachers | 3 (3.6) | 10 (11.9) | 1 (1.2) | 14 (16.7) | 56 (66.7) | 4.309 (1.182) |
| ICT/computer technology is irrelevant to the subject I teach | 15 (17.9) | 7 (8.3) | 0 | 23 (27.4) | 39 (46.4) | 3.762 (1.542) |
| Inadequate computer peripherals, such as printers, scanners, and projectors, for effective use of ICT | 12 (14.3) | 1 (1.2) | 0 | 25 (29.7) | 46 (54.8) | 4.095 (1.376) |
| Lack of encouragement from school management | 12 (14.3) | 2 (2.3) | 0 | 25 (29.8) | 45 (53.6) | 1.988 (1.460) |
| I am too old to use ICTs. | 13 (15.4) | 3 (3.6) | 0 | 36 (42.9) | 32 (38.1) | 2.536 (1.501) |

Key: M = Mean, SD = Std. Deviation, Mean of Means Score = 3.338 Agree (A), Means of Standard Deviations score = 0.73; SD = Strongly Disagree (1.01 – 1.75), D = Disagree 1.76 – 2.50), A = Agree (2.51 – 3.75, and SA = Strongly Agree (3.76 – 4.00)

Table 7 shows that the majority of the respondents agreed or strongly agreed that there is inadequate technological support for teachers; ICT/computer technology is irrelevant to the subject they teach; there are inadequate computer peripherals such as printers, scanners, and projectors for effective use of ICT; lack of encouragement from the school management system; they are too old to use ICTs; are the challenges of integrating ICTs in their schools.

Discussions

The findings suggest that most teachers reported having access to personal computers (laptops and desktops), radio sets, and internet connections on personal phones or handheld devices. This result contradicts the findings of Bariu (2020), who reported that 30.6% of teachers indicated computers were available to them, whereas 69.4% indicated otherwise. However, the majority of teachers indicated that they were unable to book or arrange a computer lab in advance for instruction. They also lacked resources such as interactive whiteboards, personal projectors, a television set, and Google Apps for lessons. A lack of resources, including insufficient computers, limited network

connectivity, and the absence of school-level ICT policies, impedes ICT adoption (Gunu et al., 2022). Mavellas et al. (2015) found that computer laboratories were available in various senior high schools but were not in adequate supply. Again, the data suggest that all the schools visited lacked a computer laboratory. The findings also show that the majority of the teachers indicated that e-assessment tools, google search engines, internet cafés, internet supplied by the government to their schools, and school projectors were not available to them.

Bariu (2020) found that a lack of or poor internet access hinders the use of ICT in teaching and learning. Without the internet, teachers and students may be unable to find relevant information to help them achieve their educational goals. These findings are in line with those of Agyemang and Amoako (2015), who found that the lack of ICT infrastructure and resources, such as computers, projectors, and internet connectivity, in many Ghanaian schools make it difficult for teachers to incorporate ICT into their teaching.

Moreover, the data show the majority of the respondents indicated that they never or rarely integrated ICTs such as laptop computers or desktop computer(s) owned by their respective schools; projectors in their lesson delivery; Free subscription to online resources; Simulations/Virtual Lab; Reference software; E-assessment tools; Google Apps for Education; interactive whiteboards; electronic-textbooks; and ICTs to type their lesson notes. These results are in line with the findings of Mavellas et al. (2015), who observed that the majority of teachers were not utilising ICTs in their lesson delivery. If the available ICT tools are limited, teachers may perceive the technology as less useful (Lanlan et al., 2019; Nugroho et al., 2018) and would not use them. The frequency of ICT use was an indicator of teachers' perceived usefulness of the technology (Cattaneo, Antonietti & Rauseo, 2025).

Antoninis et al. (2023) posited that ICT has enhanced teaching-learning interaction through the replacement of chalkboards with interactive digital whiteboards, using students' own smartphones for learning during class time, and the "flipped classroom" model, where students watched lectures at home on the computer and used classroom time for more interactive exercises. However, the majority of the teachers used the internet daily or often, and they used Handheld Smart devices (Tablets) daily or often. Teachers who frequently used ICT in their teaching perceived the technology as more useful than those who rarely used it (Cattaneo et al., 2025). Teachers can use ICT to take students beyond traditional limits, ensure their active participation in the teaching and learning process, and create vital environments for experimentation and exploration (Ajayi, 2008; Nwangwu et al., 2014). These results also confirm those of Global School Leaders (2024), which found disparities in access to reliable internet and technology-related training, and that approximately 70% of respondents say their schools do not have enough devices for their students.

Teachers' self-ratings of their competence in using ICTs for teaching and learning indicate that the majority rated themselves "Not Good" (poor) in using a word processor to type lesson notes and other work-related documents, in using ICTs to prepare students' records, and in using radio and

TV in teaching and learning. This finding contrasts with the results of Rizzo et al. (2011), who reported steady growth in the successful application of ICT in instruction, learning, and assessment. A higher level of competence increased teachers' PEOU, making them more likely to use the technology because they believe it is easy to use (Joo, Park & Lim, 2018). However, the majority rated themselves as average to excellent in their ability to search for and browse information on the web using either their smartphones/handheld devices or computers without assistance. These results are at odds with Sipilä's (2011) claims that teachers frequently use ICT for informative, organisational, and recreational purposes.

The majority of teachers rated themselves poorly across almost all items in Table 10b. Teachers rated themselves "poor" in their ability to use E-Assessment tools, e.g., Excel to assess students; Email for personal communication; storing information on the computer or other devices; pedagogical skills in ICT; Microsoft PowerPoint for presentations in class and seminars; computers for desktop publishing; and subject-based instructional software. Teacher competence in using ICT tools affects both PU and PEOU (Baddar & Khan, 2023). This result is contrary to the findings of Rizzo et al. (2011), which report steady growth in the successful application of ICT in instruction, learning, and assessment.

The data suggest that the majority of teachers strongly agreed (SA) or agreed (A) that there were inadequate computers; a lack of a school computer lab; excessive workload for teachers; a lack of power supply (electricity) in classrooms; insufficient time to use technology to teach curriculum content (Time Constraint); and an inability to cope with ICT/computer complexities. The results confirmed Van-Ess's (2013) findings that inadequate computers and peripherals for students, and dysfunctional hardware were the main barriers to the successful integration of ICT in most colleges.

The majority of respondents agreed or strongly agreed that the challenges of integrating ICTs in their schools included inadequate technological support for teachers, the perception that ICT/computer technology was irrelevant to the subject they teach, inadequate computer peripherals such as printers, scanners, and projectors for effective use of ICT, lack of encouragement from the school management system, and being too old to use ICTs. These results are consistent with those of Owusu-Fordjour, Koomson, and Hanson (2020), who noted a lack of technical skills as one of the challenges facing teachers' ICT use in education in Ghana. Challenges such as limited access to ICTs and inadequate training in using the technology influence teachers' PEOU and PU (Ke & Gong, 2025). This is why the teachers did not use them. Teachers who faced significant challenges in using ICT perceived the technology as less useful or difficult to use (Bansa, 2020).

The correlation coefficient for "access to projectors and frequency of use" is $r = .573$ ($p < 0.001$), indicating a strong positive relationship. This corroborates the findings of Mouza (2008), which reported that teachers' access to digital tools, such as projectors, was a significant predictor of their

technology integration practices. Again, the correlation coefficient between access to online resources and the frequency of handheld smart device use, such as tablets, is $r = .569$ ($p < 0.001$), indicating a moderate positive relationship. Lee et al. (2013) reported that teachers' access to digital resources, including online resources, was a significant predictor of their technology integration practices. The correlation coefficient between “access to laptop or desktop computer” and the frequency of use of school projectors is $r = .666$ ($p < 0.001$), indicating a moderate positive relationship. Rutten et al. (2012) found that computer simulations can be used to augment and improve traditional instruction. Similarly, the availability of E-assessment tools is positively correlated with free online resources for teachers, i.e., $r = .620$ ($p < 0.001$). The use of ICTs in education promotes student-teacher and student-student collaborative learning, as digital tools facilitate communication (Gertrude, 2015).

The data show a moderate-to-strong positive correlation between public basic school teachers' access to ICTs and their frequency of use. Access to computers and projectors positively influences teachers' frequency of use. Therefore, we failed to reject the alternative hypothesis that access to ICT tools has a significant positive impact on teachers' frequency of ICT use in teaching and learning.

Conclusions

The selected public basic schools lacked ICT infrastructure, such as computer laboratories, and most teachers lacked access to ICTs for teaching. Most teachers rarely or never used ICTs in their lesson delivery. This could be attributable to the lack of ICT infrastructure, electricity, and tools across the various schools, aside from handheld devices. Addressing these infrastructural gaps can improve students' academic performance in the Municipality. Those who used ICTs, such as handheld devices, did so for hedonic reasons, which are grounded in Davis' (1989) Theory of Acceptance Model (TAM). Teachers perceived those ICTs to be easier to use, hence their desire to use them.

Again, most teachers lacked the pedagogical knowledge and skills to integrate ICTs into their teaching because they perceived them as difficult to use. Suchita et al. (2023) postulated that teachers must keep abreast of the latest pedagogical strategies to successfully integrate technological tools into their classroom activities towards achieving their personal and institutional goals. The main challenges included limited technical skills and a heavy workload. Addressing these infrastructural and training gaps could boost ICT use, improve teaching quality, and enhance students' educational outcomes in the Ga North Municipality. Finally, access to ICTs was positively related to frequency of use, and frequency of use was strongly related to the perception that ICTs improve the quality of teaching and learning (positive correlation).

Recommendations

Based on the significant findings of this study, several key recommendations have been proposed to enhance the integration of Information and Communication Technology (ICT) in educational settings:

1. **Collaboration Between the Ministry of Education and the Ghana Education Service:** It is essential for the Ministry of Education (MoE) and the Ghana Education Service (GES) to collaborate actively to provide comprehensive support to schools. This includes establishing and enhancing ICT laboratories and facilities within educational institutions. Such initiatives will not only facilitate the seamless integration of technology into the teaching process but also foster an environment that encourages innovation and interactive learning among students.
2. **Frequent Integration of ICT into the School Curriculum:** The District Education Directorate must take a proactive role in ensuring that ICT is regularly and effectively integrated into the school curriculum. This integration should enrich students' learning experiences and ultimately contribute to improved student achievement and educational outcomes. By embedding ICT across subjects, students will develop essential digital literacy skills crucial to their future academic and professional pursuits.
3. **Capacity Building for Teachers by the National Teaching Council:** The National Teaching Council (NTC) should prioritise teachers' professional development by implementing comprehensive training programmes to strengthen their ability to integrate ICT into their teaching. This could include in-service training workshops and continuing professional development (CPD) courses focused on innovative pedagogical approaches that effectively leverage technology in the classroom. Equipping teachers with the necessary proficiency in using ICT tools will empower them to facilitate more engaging and interactive learning experiences.
4. **Balanced Workloads for Teachers by Headteachers:** Headteachers of basic schools should take the initiative to ensure that teachers are assigned optimal workloads that enable them to meaningfully integrate ICT into their teaching. By promoting a manageable balance between teaching responsibilities and personal well-being, educators will be better equipped to explore and utilise technology in innovative ways, thereby enriching their students' learning experience while maintaining a healthy work-life balance.

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