Teacher Educators' Acceptance and Pedagogical Use of ICT: The Role of Social Influence, System Characteristics, and Individual Differences

Wilson Osafo Apeanti, Solomon Ofori Gyane Jnr

Article Info

Article History

Received:
25 July 2025
Accepted:
25 November 2025

Keywords

Pedagogical integration of ICT
Teacher education
Social influence
System characteristics
Individual differences

Abstract

The pedagogical integration of Information and Communications Technology (ICT) in Colleges of Education (COEs) has a cascading effect on educational practice across all levels of education. Despite various polices on ICT integration in teacher education, the pedagogical integration of ICT in CoEs remains inconsistent. This study investigated the effect of social, system and individual factors on the tutors' acceptance and actual use of ICT. The gap between acceptance and the actual use behaviour of tutors was also studied. Using a validated questionnaire, a random sample of 109 tutors was surveyed for the study. The result showed a significant gap between a high level of ICT acceptance ($M = 4.49$) and low actual use of ICT for instruction ($M = 3.99$; $t = 8.661$, $p < .001$). A multiple linear regression analysis revealed that social influence, system characteristics, and individual differences account for 32.6% of the variance in ICT acceptance. Among these factors, social influence emerged as the most significant predictor ($\beta = .561$, $p < .001$). However, social influence and individual characteristics accounted for 23.8% of the variance in actual use of ICT, but system characteristics had no significant effect. From the findings of the study, the provision of infrastructure and policy alone is not enough to drive ICT integration in CoEs, continuous professional development programmes, collaborative peer support and institutional support are recommended to bridge the gap between acceptance and actual use of ICT in teacher education.

Introduction

Globally, schools are doing their best to integrate Information and Communication Technology (ICT) tools to enhance the flexibility and interactivity of their lessons (Das, 2019; Naluwooza et al., 2023). Today, teachers are expected to integrate ICT in their instructions to enhance learners' engagement and improve their academic performance. However, the successful integration of ICT in the classroom to a large extent depends on the social, systemic, and teacher's individual characteristics (Msambwa, Daniel & Lianyu, 2024). Technology use in the classroom is facilitated by the attitude of teachers and students (Akram et al., 2022; Teo, 2011; Vongkulluksn et al., 2018). Teachers who have positive attitudes toward technology use are likely to integrate technologies in their lessons (Akram et al., 2022; Prestridge, 2012; Tondeur et al., 2017). Moreover, teachers' use of ICT is influenced by their educational philosophies. They select teaching materials and technologies in alignment with their teaching philosophy (Akram et al., 2022; Sang et al., 2010).

Teachers need knowledge to integrate technology into their instruction. The specific kind of knowledge teachers need to teach effectively with technology has been outlined in the Technology Pedagogical Content Knowledge (TPACK) framework. The TPACK framework postulates that teachers need to develop knowledge in how to integrate technology with pedagogy and the content of the respective subject taught (Mishra & Koehler, 2006; Cabero-Almenara et al., 2021). This will help them integrate technology to enhance teaching and learning activities.

The Colleges of Education (CoEs) have a pivotal responsibility in how prospective teachers are trained with regard to their ICT integration skills. This is due to the fact that the manner in which the teachers are trained will influence their future teaching practices. Hence, CoEs have a "trickle down" effect on how pedagogical integration of ICT is done at all levels of the educational system. Consequently, the CoE tutors need ICT infrastructure, institutional backing, further training, social encouragement, and motivation. Moreover, certain characteristics of the tutors, like their ability to use digital technology, their willingness to use new technology, and how they think in general, as well as other social characteristics, also have a bearing on the integration of ICT in CoEs. Hence, there is a need to deeply analyse these issues and how they impact the efforts made in terms of ICT integration.

Statement of the Problem

The Ministry of Education in Ghana has an ICT in Education Policy (Ministry of Education, 2015), which serves as a foundational document to promote ICT integration in education. The aim is to improve access and equity at all levels of the educational system through technology integration. They consider technology as a tool for improving teaching and learning in educational institutions. However, the evidence suggests that tutors in CoEs are yet to demonstrate digital leadership in the use of ICT in teaching and learning despite the availability of ICT facilities (Aidoo & Chebure, 2024; Debrah et al., 2021). This means that the presence of ICT facilities alone does not guarantee the successful integration of technology in teaching and learning (Agyei, 2021; Buabeng-Andoh, 2019). A successful technology integration into teaching and learning is a function of the social context as well as the institutional culture, administrative support, professional development, and accessible resources (Aidoo & Chebure, 2024; Lawrence & Tar, 2018).

Although international and national policies emphasise the importance of ICT integration in education, the adoption of ICT in Ghanaian CoEs has been patchy. Underlying factors such as poorly developed infrastructure, insufficient training, little administrative encouragement, and uneven digital literacy still impede the effective training of teachers in technology integration. Governmental initiatives and policies regarding digital education and its integration in the school system have not yielded systematic results (Gyampoh, 2020). If CoEs do not appreciate the interplay of the social, system and individual dimensions in the context of ICT adoption, they will produce graduates who are not able to use technology properly in their classes. This will defeat the purpose of the country's education reforms and deepen the education and technology gap among learners.

The integration of ICT as part of global and national policies has not been uniformly adopted across all CoEs in

Ghana (Aboagye, 2021; Debrah et al, 2021). Part of the ongoing issues in the integration of ICT in teacher education is limited infrastructure, inadequate training, lack of supportive leadership and digital literacy among others (Aidoo & Chebure, 2024; Arkorful et al., 2021; Gyane, 2021). Many policies on digital education and other initiatives implemented by the government have not been successful in ways that would justify the continuing optimism surrounding the future of ICT integration (Kubuga et al., 2021; Abedi, 2023). The complexities of sociocultural, structural, and individual-level dynamics of ICT integration are still poorly articulated (Buabeng-Andoh, 2019; Lawrence & Tar, 2018). These CoEs still lack educational programs aimed at developing and enhancing tutors' competence in ICT pedagogy (Aidoo & Chebure, 2024; Akyeampong, 2017). This is likely to impede the development of education in the country and may result in increasing disparities in educational opportunities among learners (Baidoo-Anu et al., 2023; Boadu, 2024).

Acceptance and integration of ICT within the frameworks of the educators at CoEs hinges on carrying out a detailed analysis of social, system and individual factors in order to determine the scope and impact of their interplay (Ngao et al., 2022; Fernandes et al., 2020). These factors will provide the rationale needed for policy formulation, planning at the institution and its capacity development efforts (Agyei, 2021; Kebritchi et al., 2017). There is ICT education in the country which suggests the presence of a certain level ICT skills and teaching method which calls for adequate and context-relevant continuous professional development (Aidoo & Chebure, 2024; Jimoyiannis, 2010).

There is a risk of CoEs failing to equip their students with the much-needed skills to effectively integrate technology in the teaching and learning processes. This is because the CoEs do not have a comprehensive grasp of the interplay of social, system and individual factors which ICT adoption hinges on. This is a crucial aspect which, if neglected, will defeat the purpose of the national education reforms and will, in fact, deepen the existing inequalities in education. This study assesses the impact of social, institutional and individual factors on the level of ICT adoption and use in teaching practice at the CoEs in Ghana.

Purpose of the Study

The study investigates which factors influence Ghanaian CoEs tutors to accept and use ICT in their work. It examines how social factors, system and personal characteristics influence the acceptance and usage of ICT.

Research Objectives

The research aims to achieve two primary objectives:

- to determine the difference between CoE tutors' acceptance of ICT tools and their actual use in instructional practices, and how these two variables are related.
- To determine how social influence and system characteristics interact with individual differences to impact ICT tool acceptance and usage in CoEs.

The research seeks to provide evidence-based recommendations for policy development and institutional practice.

Research Questions

1. What is the difference between CoE tutors' acceptance of ICT tools and their actual use in instructional practices, and how are these two variables related?
2. How do social influence, system characteristics, and individual differences impact the acceptance and use of ICT tools in instruction at CoEs?

Review of Literature

Level of ICT integration in Teacher education

Teacher education requires ICT integration to train educators who will handle the digital transformation of education. The successful implementation of ICT in teacher education requires solutions for professional development, teaching technology skills and removal of system-level obstacles that block ICT adoption (Oubibi et al., 2024). Teacher training institutions need to achieve alignment between their actual practices and the policies that guide their work. The widespread availability and advances in ICT have brought about a complete transformation of how students learn. The digital nature of contemporary students requires teachers who can use technology in their teaching methods in response to the evolving nature of education (Aidoo & Chebure, 2024). The education sector now requires teachers who possess modern skills and knowledge to implement technology-based teaching methods (Mthembu & Makondo, 2024; Aidoo & Chebure, 2024). The theoretical frameworks supporting ICT integration in teacher education have undergone substantial development. The Technology Pedagogical Content Knowledge (TPACK) framework, for example, provides educators with a theoretical basis to understand the specific knowledge required for technology integration (Mishra & Koehler, 2006; Aidoo & Chebure, 2024). Also, the well-validated Technology Acceptance Model (TAM) demonstrates how teachers' personal characteristics regarding ICT integration affect their actual technology use in teaching. The integration of ICT depends on how teachers perceive its usefulness and ease of use, as well as their attitudes and the level of institutional backing (Moradi, 2025).

The level of ICT integration varies significantly in different contexts. Countries like Kenya and South Africa have demonstrated high levels of ICT integration with the introduction of learning management systems in their teacher training institutions (Oubibi et al., 2024). In the Ghanaian context, even though there have been significant advances in innovation for pedagogical integration of ICT in teacher education, teachers' competence in adopting technology is still questionable (Aidoo & Chebure, 2024). Different educational settings show wide variations when it comes to their implementation of ICT systems. Teacher educators still face challenges when integrating technology in their instruction (Aidoo & Chebure, 2024).

The intersection of ICT integration with teacher education shows mixed, yet mostly favourable outcomes, with studies conducted in the last 10 years showing tremendous boosts in the digital capabilities of teachers. Digital literacy assessments show improvement in digital competency among teachers (Oubibi et al, 2024). In Ghana, teachers agreed that they use technology to acquire new skills, improve their knowledge and access resources for teaching (Aidoo & Chebure, 2024).

Although there are positive outcomes, there are still a global lack of ICT integration across institutions of teacher education. Infrastructure is still the main problem, particularly the awful ICT infrastructure in the rural parts of Sub-Saharan Africa (Oubibi et al., 2024).

The rapid advances in new technologies always create a new skill gap in teacher training. This requires a multi-contextual paradigm shift in teacher education, which focuses on how to harness new technologies for effective teaching and learning (Kaminskienė et al., 2022). In Ghana, the new skill gap is even worse. CoE tutors have to deal with infrastructure challenges such as the lack of computers, outdated software and poor internet connectivity, which leads to many students not being able to participate in online classes (Aidoo & Chebure, 2024). Additionally, the high cost of technology, coupled with the lack of low-cost alternatives, further impedes the technology acquisition effort of CoEs.

Yet, the challenges in technology integration are not limited to infrastructural difficulties alone, but also instructional practices, teachers' pedagogical beliefs, professional development opportunities and institutional support. Digital skills in teaching and learning at the teacher education level need to be addressed more empirically. Systematic reviews of the literature identify sustained professional development efforts as the answer to the gaps in digital skills (Kaminskienė et al., 2022). To achieve successful ICT integration in CoEs, the provision of ICT infrastructures must be supported by effective training, policies and context sensitivity. Professional development programs for teachers should be targeted with specific attention to contextual and organizational factors that influence successful implementation (Arstorp et. al., 2024). Aidoo and Chebure (2024) suggest that continuous professional development programs that target specific teacher competencies are vital for equipping teachers for ICT integration.

The Effect of Social Influence, System Characteristics and Individual Differences on ICT Integration in Teacher Education

Theoretical Foundation of the Study

One of the oldest models that has been used to explain factors that affect an individual's adoption of technology is Davis' (1989) Technology Acceptance Model (TAM). This model has been widely applied and supported in the field of ICT usage and acceptance among teachers for educational purposes. The core concepts of the theory, which are "perceived ease of use" and "perceived usefulness" have been empirically supported throughout the literature. For instance, the work of Chen et al. (2023) confirmed the influence of perceived usefulness and perceived ease of use on teachers' attitudes towards computer use. Apply a TAM model to study. A similar study conducted by Ifenthaler and Yau (2021) used the TAM approach to examine attitudes of using technology in classroom chat, e-lectures, and mobile virtual reality (VR). Holden and Karsh (2010) also found that perceived usefulness and ease of use were significant interacting variables in individuals' use of the system.

Kemp (2024a) suggested the Extended Educational Technology Acceptance Model (EETAM), which incorporates several other pedagogical and learning theories. This model was proposed to fill the contextual gaps of TAM in educational settings. Huang et al. (2023) demonstrated the applicability of TAM to the

prediction of students' intention to use metaverse learning platforms. Venkatesh and Bala (2008) also synthesised the cumulative TAM research into a set of determinants which fell under four broad categories: individual differences, system characteristics, social influence, and facilitating conditions. These four factors control perceived usefulness and perceived ease of use in TAM. Individual differences, which are characteristics of individuals such as personality traits, cognitive styles and demographics, are shown to affect the way in which a person perceives a system. The system nature covered the nature of the information system within the organisation that influences one's perceptions of the usefulness and ease of use. In contrast, social influence includes normative and intersubjective factors that contribute to individuals' perceptions with regard to technology. These enablers are the organisational and technical layers that support (or inhibit) the adoption of technology, i.e. resources, technology leadership, training, and management commitment. A variation of this model was adapted as the theoretical basis of the present study (see Figure 1).

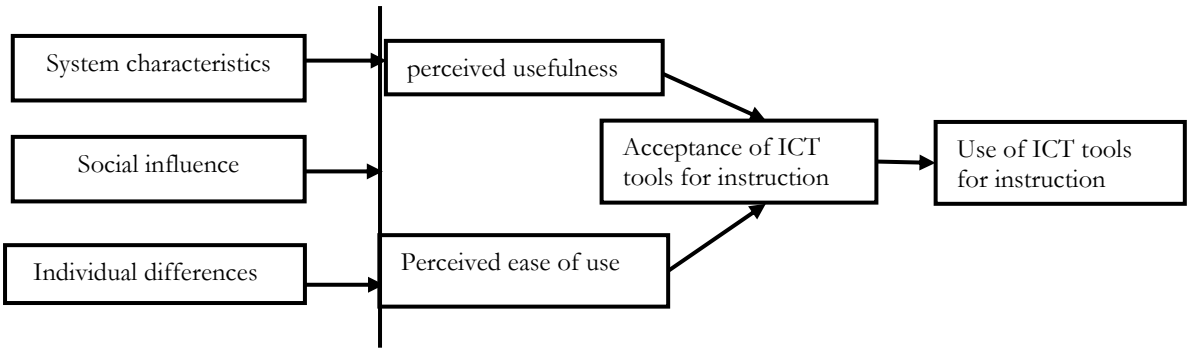

Figure 1. Syntesised TAM Model adapted from Venkatesh and Bala (2008)

Since the social factors and the individual differences determinants have drawn both support and argument in the literature on their impact, Venkatesh and Davis (2000) extended TAM into the TAM2 model as an attempt to address this gap by adding social influence elements, particularly subjective norms, voluntariness, and image, to underscore social context importance. Nevertheless, findings have not been consistent. For instance, Benali et al. (2024) reported that social influence in the case of the use of the ChatGPT acceptance model had no significant impact on its perceived ease and usefulness, as other factors such as awareness and perceived enjoyment had more impact. On the other hand, Ghomi et al. (2024) demonstrated with network analysis how social and personal factors combined to influence teacher educators' acceptance of technology.

Wong (2017) showed the impact students' backgrounds and experiences had on accepting the use of collaborative ICT tools on problem-based learning. These subtle findings correspond with the wider assessment of the criticisms of TAM. Smith et al. (2024) defended the assertion that TAM is overly critical of usefulness and ease of use absent of defining factors important to specialized fields like healthcare and education. In the same vein, Chen et al. (2023) discussed the level of instructor support needed and the students' expected academic achievements as reinforcement to the interrelated nature of TAM constructs. Researchers continue to highlighted the importance of thorough frameworks that embrace taught and situational factors (Kemp, 2024a). More empirical studies in technology acceptance and use are needed to capture evolving acceptance patterns as users become familiar with emerging educational technologies.

Social Influence

Social factors such as the opinions, behaviour and recommendations of peers strongly affect the extent to which teachers adopt technology in their instruction. Subjective norms, which are social pressure from important people, have been identified as vital in understanding the perception of teachers about the usefulness of technology (Galimova et al., 2024). A study by Braf-Vlachy and Buhtz (2018) shed light on the role social influence plays in shaping the technology adoption behaviour of individuals. However, attitude has been found to mediate the effect of social influence on technology adoption (Kulviwat et al. 2019).

Social influence also affects the technology usage expectation because when more people adopt a technology, people perceive that technology to be of more value, which aligns with the network effect theory (Koening-Lewis et al., 2010). The level of social influence is also determined by demographics and cultural differences. For example, a study by Jia et al. (2024) shows that compared to men, women are more influenced by subjective norms. Moreover, a collective technology use culture has more effect on subjective norm than individual use. This means that contextual conditions are also important in technology adoption.

A study by Tsia (2017) found that institutional contexts, peer expectations and supervisor support have an impact on technology adoption decisions of teachers. These findings have also benn confirmed by similar studies in the literature. Peer and social endorsement, online reviews, digital word of mouth, and normative pressure have been found to increase the likelihood of teachers adopting technology in their instructional practices (Teo et al., 2012; Ortega et al., 2022). This means that social influence is an important factor which determines whether or not teachers will use technology in their instruction. Social influence relates to the contextual, organisational and cultural factors that affect on teachers' technology adoption. It is therefore vital to leverage social networking and peer support in the technology integration effort in CoEs.

System Characteristics

Institutional system characteristics are critical in understanding teachers' acceptance and use of ICT in education. The factors related to Institutional systems factors often override individual factors in determining technology adoption success. CoEs that promote systems with strategic plans and policies for ICT integration directly impact tutors' technology adoption behaviours (Zhao et al., 2022). Availability of ICT infrastructure, which is a key institutional factor, is the basis for any meaningful technology integration in CoEs. Power outages, slow internet connectivity, inadequate ICT tools and outdated software still remain major barriers to ICT use in CoEs (Siddiq et al., 2022).

In Ghana, apart from limited infrastructure, which hinder ICT integration, inadequate institutional support, lack of training, and weak administrative structures further hinder ICT integration efforts at all levels of education (Yang et al., 2025; Smith & Johnson, 2024, Anamuah-Mensah et al., 2024). To ensure meaningful ICT integration in instruction, institutional policies and continuous teacher profession development programs must align with classroom practices (UNESCO, 2023; Camocho-Zuniga et al., 2024). However, continuous teacher

professional development programs must focus on developing teachers' technology and pedagogical knowledge (Belay et al., 2020; Baharuddin et al., 2024).

Institutional culture is also an important factor. Institutions with a culture which promotes collaboration, innovation, technical support systems, and experimenting with new technologies create a conducive environment where teachers feel safe, have low resistance and anxiety to integrate technology in their instructional practices (Konig et al,, 2024; Peterson & Williams, 2023). Investment in technology remains vital. Institutions with dedicated budgets and strategic technology investments have the potential to achieve a more meaningful technology integration. Ad-hoc procurements and lack of technology investments are significant barrier (Thompson et al., 2024). In summary, the institutional system characteristic can enable or impede successful technology integration efforts in CoEs. Apart from considering teacher factors, there is a need for strategic institutional technology transformation instead of isolated random interventions.

Individual Differences

Individual differences among teachers remain one of the most significant determinants of ICT acceptance and integration in education. Teachers' beliefs, competence and personal characteristics are the reasons why technology adoption varies across different contexts. Research shows that teachers' self-efficacy is a critical factor. Teachers with higher technology self-efficacy, positive attitude, ICT literacy and experience demonstrate consistent technology integration in their instructions (Huerta-Wong and Schoech, 2023; OECD, 2024; Alenezi et al., 2024; Alenezi et al., 2024).

The ability of teachers to adapt to emerging technologies is also crucial. Yang et al (2024) found that the discrepancy in teacher skills accounts for the difference in emerging technology adoption among teachers. Teaching experience is also positively correlated with technology adoption (Smith and Johnson, 2024). Important individual factors like age, gender, workload, perception and pedagogical belief relate strongly to teachers' technology adoption behaviours (Anderson and Davis (2014; Huerta-Wong & Schoech, 2023). Evidence in the literature shows that individual differences related to demographics, competence and behaviour influence ICT integration. Consequently, CoEs need strategies that address these differences through targeted professional development and training programs.

Methodology

The study employed a cross-sectional survey approach. This method was chosen for its ability to provide quick, descriptive insights without ongoing observation. While surveys can be conducted in various ways, the study used face-to-face questionnaires to ensure a high response rate and reliable data collection. The questionnaires were administered in a controlled setting within the colleges, which created an environment that minimised external influences, allowing participants to provide accurate and independent responses. This approach ensured the efficient collection of comprehensive and structured data.

Population and Sampling

The population for this study was tutors from the 46 Colleges of Education in Ghana. A sample of 109 tutors from various Colleges of Education in Ghana was randomly selected as participants.

Instrument

The questionnaire that was used for the study was adapted from Fidan, Debbag and Çukurbaşı (2020) and Venkatesh and Bala (2008). It consisted of statements rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), and it included both positive and negative items. Negative items were reverse-coded during analysis. This scale was selected for its clarity and ease of use, allowing for both basic and advanced statistical analysis, such as ANOVA and regression, and was found to be highly reliable. The instrument's validity was confirmed through pilot testing and expert review, and its reliability was supported by a Cronbach's alpha value of 0.7, indicating acceptable internal consistency (Kothari, 2017).

Data Collection and Analysis

Questionnaires were distributed through representatives on the various COEs, and an online link was shared on the Colleges of Education Association of Ghana (CETAG) platforms, which serve tutors across all 46 colleges. Both hard and soft copies of the completed questionnaires were collected and coded using SPSS for data analysis.

Ethical Considerations

The researcher obtained permission from the college Principals before administering the questionnaire and assured participants of confidentiality by not requiring names on the questionnaire. Each participant signed a consent form, confirming their agreement to participate. Anonymity was maintained throughout the study, aligning with ethical guidelines that define acceptable behaviour in research.

Results

Demographics

Out of 109 tutors surveyed, 70.6% (77) were male, while 29.4% (32) were female, showing a male dominance. The age distribution indicated that 36.7% (40) were 41 years and older, and 35.8% (39) were aged 36-40, with the smallest group being those aged 30-35 at 27.5% (30). Most respondents were over 35 years old. In terms of education, 93.6% (102) had a master's degree, while 6.4% (7) held PhDs. Regarding teaching experience, over half (53.2%, 58) had taught for 10 to 20 years, 24.8% (27) had 21 to 30 years, 19.3% (21) had less than 10 years, and 2.8% (3) had more than 30 years. The participants taught various subjects, with 52.3% (57) teaching Mathematics/Information and Communications Technology, followed by Languages (8.3%, 9), Science (13.8%, 15), Social Sciences (11.9%, 13), Vocational Studies (2.8%, 3), and Education (11.0%, 12) as shown in Table 1.

Table 1. Demographic Characteristics of Respondents

Variable	Category	Number	Percent (%)
Gender			
	Male	77	70.6
	Female	32	29.4
Age			
	30-35	30	27.5
	36-40	39	35.8
	41 and above	40	36.7
Highest Educational Attainment			
	Masters	102	93.6
	PhD	7	6.4
Teaching experience (Years)			
	Below 10	3	19.3
	10 to 20	58	53.2
	21 to 30	27	24.8
	Above 30	21	2.8
Subject taught			
	Languages	9	8.3
	Mathematics/Information and Communications Technology	57	52.3
	Science	15	13.8
	Social Sciences	13	11.9
	Vocational	13	2.8
	Education	12	11.0
	Total		**100.0**

Research question 1: What is the difference between CoE tutors' acceptance of ICT tools and their actual use in instructional practices, and how are these two variables related?

This section presents the findings on the level of acceptance and use of ICT tools in instructional practices by CoE Tutors. Table 1 shows the descriptive statistics for the results of the Likert scale of five items (1-Strongly Disagree, 2-Disagree, 3-Undecided, 4-Agree, 5-Strongly Agree) with 3.0 as the midpoint. On this continuous scale, a mean score less than 3.0 indicates a disagreement, while a mean score greater than 3.0 indicates an agreement.

Level of Acceptance

The tutors showed a high level of acceptance of ICT integration in classroom instructional practice, from the findings in Table 2. Among all measured items, the perception that ICT improves student learning outcomes received the highest mean score (M = 4.56, SD = 0.600), followed by the perception that ICT can make them

teach more effectively (M = 4.55, SD = 0.739). Tutors believe strongly that ICT enhances both teaching outcomes and student achievement levels. Tutors evaluated ICT as an efficient system through their high ratings about its ability to reduce time and work requirements (M = 4.53, SD = 0.701). Tutors rated ICT as an educational tool that creates more captivating lessons, which scored a mean score of 4.52 (SD = 0.661). Although the lowest mean was observed for the ease of using ICT tools (M = 4.31, SD = 0.802), the score still indicates a generally positive response. The responses to this statement showed the greatest variance because most tutors find ICT tools user-friendly but others encounter difficulties due to different digital skill levels. The findings reveal that tutors strongly accept ICT because they recognize its benefits and the efficiency it provides and its capability to improve educational practices and student learning.

Table 2. Acceptance of ICT Tools in Instructional Practices

Variables	N	Mean (M)	Std. Dev (SD)
Level of Acceptance			
Using ICT tools in instructional practices helps me to improve students' learning outcomes	109	4.56	.600
Using ICT tools in instructional practices helps me to teach more effectively	109	4.55	.739
Using ICT tools in instructional practices saves time and effort	109	4.53	.701
Using ICT tools in instructional practices makes teaching more interesting	109	4.52	.661
Using ICT tools in instructional practices is easy for me	109	4.31	.802

Level of Use

The study examined tutors' level of ICT use in their instructional practices using five-point Likert scale items. The mean and standard deviation scores of the items are shown in Table 3. Overall, the mean scores ranged from 3.23 to 4.53, indicating moderate use of ICT tools in their teaching. Most respondents reported that they use ICT tools in their instructional practices (M = 4.53, SD = 0.63). Participants also agreed that they find it easy to integrate these tools into their teaching (M=4.26, SD=0.81). They also agreed that learning to use ICT tools in their instructional practices is straightforward (M=4.25, SD=0.70), and that troubleshooting ICT problems during instruction is manageable (M=3.72, SD=0.99). Additionally, they expressed a willingness to recommend the use of ICT tools in instructional practices to other tutors (M=3.23, SD=1.66).

Table 3. Use of ICT Tools in Instructional Practices

Variables	N	Mean (M)	Std. Dev(SD)
Level of Use			
I use ICT tools in my instructional practices.	109	4.53	.632
I find it easy to integrate ICT tools into my teaching	109	4.26	.810
It is easy for me to learn to use ICT tools in instructional practices	109	4.25	.696

Variables	N	Mean (M)	Std. Dev(SD)
I find it easy to troubleshoot ICT problems that occur during instructional practices	109	3.72	.992
I would recommend using ICT tools in instructional practices to other tutors	109	3.23	1.653

The research compared the level of tutors' acceptance and use of ICT tools during their classroom practices. The overall means and standard deviations of the items in Table 2 and Table 3 were computed and compared as shown in Table 4.

Table 4. Comparison of Levels of Acceptance and Levels of Use of ICT Tools in Instructional Practices

Levels	N	Mean	Std. Deviation	t	df	p-value
Acceptance	109	4.49	.50815	8.661	108	0.000
Use	109	3.99	.51423			

(Correlation (r) = 0,308, p=0.01)

The tutors showed higher acceptance ratings for ICT tools (M = 4.49, SD = 0.508) compared to their actual classroom usage (M = 3.99, SD = 0.514) (see Figure 1). A paired sample t-test analysis showed a significant difference between the levels of acceptance and use of ICT for instruction (t= 8.661, p = 0.001). This confirms the fact that tutors generally have a high level of acceptance of ICT; however, this does not fully translate into their actual use of ICT in their instructional practice. A correlation analysis also showed a moderate positive relationship between acceptance levels and actual usage of ICT tools (r = 0.308, p = 0.01). This means that the more tutors accept the relevance of integrating ICT tools in instructional practices, the more likely they might use them in their teaching.

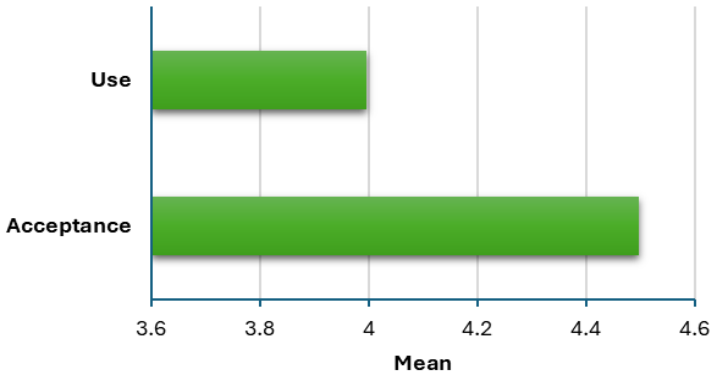

Figure 1. Levels of Use and Acceptance of ICT Tools

Research question 2: How do social influence, system characteristics, and individual differences impact the acceptance and use of ICT tools in instruction at CoEs?

To answer this research question, which investigates the extent to which social influence, system characteristics, and individual differences affect the acceptance and use of ICT tools in instruction at the CoEs, a series of items

related to these factors was administered. A mean score of less than 3.0 indicated disagreement, while a mean score of 3.0 or higher signified agreement.

Social Influence

Table 5 shows that the majority of the participants strongly agreed or agreed that their colleagues use ICT tools in instructional practices, which encourages them to use ICT in their instruction as well (M=4.01, SD=0.93) . Respondents agreed that the use of ICT tools in instructional practices is valued by the parents and students (M=3.94, SD=0.79), it improves the class climate which motivates them to use ICT tools in their instructional practices (M=4.30, SD=0.67) and tutors who use ICT are highly commended by the school (M=4.05, SD=0.90). These findings show that social influence is an important factor which influences the pedagogical integration of ICT in CoEs. Support from fellow tutors, parents, students and recommendations from the school encourage tutors to integrate ICT in their instruction.

Table 5. Levels of Social Influence for ICT Integration

Variables	N	Mean	Std. Dev
Social Influence	109	4.01	.928
My colleagues use ICT tools in instructional practices. Their usage encourages me to use them as well.			
The use of ICT tools in instructional practices is valued by the parents and students	109	3.94	.785
The use of ICT tools improves the class climate which motivates me to use ICT tools in instructional practices	109	4.30	.674
Colleagues who use ICT tools in instructional practices are highly commended by the school	109	4.05	.896

System Characteristics

As shown in Table 6, the tutor noted that their school encourages the use of ICT tools in instructional practices (M=4.31, SD=0.72) and the use of ICT tools in instructional practices is supported by the government (M=3.62, SD=1.19). They also established that the ICT tools available at their school were of good quality (M=3.65, SD=1.13), reliable (M=3.47, SD=1.23) and easy to use (M=3.80, SD=1.00). The finding shows that there is some level of system characteristics that support ICT integration in teaching and learning.

Table 6. Levels of System Characteristics that Support ICT Integration

Variables	N	Mean	Std. Dev
My school encourages the use of ICT tools in instructional practices	109	4.31	.716
The use of ICT tools in instructional practices is supported by the government	109	3.62	1.185
The ICT tools available at my school are of good quality	109	3.65	1.133
The ICT tools available at my school are reliable	109	3.47	1.229
The ICT tools available at my school are easy to use	109	3.80	.989

Individual Differences

Table 7 shows individual differences in the use of ICT. The majority of respondents agreed that they feel comfortable using ICT tools in instructional practices (M=4.39, SD=0.68), they are confident in their ability to troubleshoot ICT problems that occur during instructional practices (M=3.78, SD=0.91), they often use ICT tools outside of instructional practices (M=4.25, SD=0.66), they were interested in learning about new ICT tools for instructional practices (M=4.52, SD=0.62) as well as the ICT tools available at their school, were similar to those they use outside of instructional practices (M=3.84, SD=0.97). These findings show that the difference in individual characteristics, such as private use of computers, ability to troubleshoot ICT problems and willingness to learn about new instructional technologies, play an important role in understanding ICT integration behaviour among CoE tutors.

Table 7. Levels of Individual Differences in ICT Integration

Variables	N	Mean	Std. Dev
I feel comfortable using ICT tools in instructional practices	109	4.39	.679
I am confident in my ability to troubleshoot ICT problems that occur during instructional practices	109	3.78	.906
I often use ICT tools outside of instructional practices	109	4.25	.655
I am interested in learning about new ICT tools for instructional practices	109	4.52	.618
The ICT tools available at my school are similar to those I use outside of instructional practices	109	3.84	.973

The data collected from the Social Influence, System Characteristics and Individual Differences were aggregated and computed to find their overall means and standard deviation as shown in Table 8. Overall, the mean of Social Influence was 4.16 with a standard deviation of 0.507. System Characteristics had a mean of 3.77 with a standard deviation of 0.825, whereas Individual Differences had a mean of 4.05 with a standard deviation of 0.501.

Table 8. Descriptive Statistics of Factors

Variables	N	Mean	Std. Deviation
Social influence	109	4.16	.50704
System Characteristics	109	3.77	.82544
Individual Differences	109	4.05	.50067

To achieve objective two of investigating the effect of Social Influence, System Characteristics and Individual Differences on the extent of Acceptance and Use of ICT Tools for Instruction, Multiple Linear Regression Analysis was used. All the necessary assumptions for multiple linear regression analysis, such as the use of continuous data, linearity, independence of residuals, multicollinearity and homoscedasticity, were tested and satisfactorily met.

Effect of Independent Factors on Acceptance of ICT Tools for Teaching

The independent variables: Social Influence, System Characteristics, and Individual Differences were used to predict "Acceptance of ICT tools for teaching" From the ANOVA table (see Table 9) for the regression statistics shows that the regression model was statistically significant (F=16.906, p=.000). This means that at least one of the predictors in the model has a significant effect on the dependent variable, as a result "Social Influence," "System Characteristics," and "Individual Differences" are statistically significant in explaining the variation in the "Acceptance of ICT tools for teaching".

Table 9. ANOVA of Regression Statistics

ANOVA[a]					
Source	Sum of Squares	Df	Mean Square	F	Sig.
Regression	9.083	3	3.028	16.906	.000[b]
Residual	18.805	105	.179		
Total	27.888	108			

a. Dependent Variable: Acceptance of ICT Tools for teaching

b. Model: (Intercept), Social Influence, System Characteristics, Individual Differences

The regression model in Table 10 shows that the independent variables which are Social Influence," "System Characteristics," and "Individual Differences", in linear combination explain 32.6% (R^2=0.326) of the variance in tutors' acceptance of ICT tools in teaching.

Table 10. Multiple Linear Regression Statistics

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.571[a]	.326	.306	.42319

a. Predictors: (Constant), Individual Characteristics, Social Influence, System Characteristics

The results from the regression shows that, we can predict the level of tutor acceptance of ICT tools in teaching based on the independent variables. The regression model statistics in Table 11 show the effect of each independent variable on the dependent variable.

Table 11. Multiple Linear Regression Analysis of Acceptance of ICT Tools for Teaching

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.638	.416		3.938	.000
	Social Influence (SI)	.563	.102	.561	5.539	.000
	System Characteristics (SC)	-.157	.069	-.256	-2.284	.024

Individual Characteristics (IC)	.268	.095	.272	2.802	.006

a. Dependent Variable: Acceptance of ICT Tools for Teaching

The results indicate that Social Influence has a significant positive effect on Acceptance of ICT Tools for Teaching $(B = 0{,}561, p < 0.001)$ but System Characteristics have a significant negative effect on Acceptance of ICT Tools for Teaching $(B = -0.0256, p = 0.024)$. Individual Characteristics have a significant positive effect on Acceptance of ICT Tools for Teaching $(B = 0{,}272, p = 0.006)$. In summary, the table shows that social influence, system characteristics, and individual characteristics are significant predictors of acceptance of ICT tools for teaching, with social influence having the strongest effect.

The regression model is as follows:

*Acceptance of ICT Tools for teaching=1.638 + 0.563*SI - 0.157*SC + 0.268*IC*

Effect of Independent Factors on the Actual Use of ICT Tools for Teaching

Table 12 shows the ANOVA of the regression model which the use of ICT Tools for Teaching is the dependent variable. The regression model was found to be statistically significant (F=10.948, p=.000). This means that the linear combination of the independent variables significantly predicts the actual use of ICT for teaching.

Table 12. ANOVA of Use of ICT Tools for Teaching

ANOVA[a]					
Source	Sum of Squares	Df	Mean Square	F	Sig.
Regression	6.805	3	2.268	10.948	.000[b]
Residual	21.754	105	.207		
Total	28.559	108			

a. Dependent Variable: Use of ICT Tools for Teaching

b. Predictors: (Constant), Individual Characteristics, Social Influence, System Characteristics

The regression model in Table 13 shows that the independent variables which are Social Influence, "System Characteristics," and "Individual Differences", in linear combination explain 23.8% (R^2=0.3238) of the variance in tutors' use of ICT tools for teaching.

Table 13. Multiple Linear Regression Statistics

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.488[a]	.238	.217	.45517

a. Predictors: (Constant), Individual Characteristics, Social Influence, System Characteristics

Table 14 shows the coefficients of the independent variables that predict the use of ICT tools for teaching. The results indicate that Social Influence has a significant positive effect on Use of ICT Tools for Teaching

(B=0.325, p = 0.004), System Characteristics has no significant effect on Use of ICT Tools for Teaching (B=-0.001, p = 0.988) and Individual Characteristics has a significant positive effect on Use of ICT Tools for Teaching (B=0.260, p = 0.013). Thus, this table shows that social influence and individual characteristics are significant predictors of the use of ICT tools for teaching, while system characteristics have no significant effect.

Table 14. Multiple Linear Regression Analysis of Use of ICT Tools for Teaching

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.565	.447		3.499	.001
	Social Influence (SI)	.325	.109	.321	2.978	.004
	System Characteristics (SC)	-.001	.074	-.002	-.016	.988
	Individual Characteristics (IC)	.260	.103	.262	2.536	.013
a. Dependent Variable: Use of ICT Tools for Teaching						

The regression model is as follows:

*Use of ICT Tools for teaching=1.565+ .325*SI + .260*IC*

Discussion

The findings of the research indicated that the tutors in Colleges of Education (CoEs) accepted ICT integration positively. They appreciate its ability to improve students' learning outcomes, participation, and cut down on the workload. This aligns with previous research on the ICT integration into teacher education (Oubibi et al., 2024; Aidoo & Chebure, 2024). The results are also consistent with the Technology Acceptance Model (TAM) position, which argues that perceived usefulness is the dominant predictor of adoption (Davis, 1989; Moradi, 2025). However, the actual classroom use of the ICT tools was still modest, indicating a gap between acceptance and use. This gap highlights contextual issues such as poor infrastructure, inadequate institutional backing, and restricted professional development opportunities, consistent with the criticisms of earlier works (Kaminskienė et al., 2022; Oubibi et al., 2024; Aidoo & Chebure, 2024). While acceptance was positively associated with use, the barriers to actual use are still more extensive which fully aligns with the synthesised TAM (Venkatesh & Bala, 2008).

Further, social influence, system characteristics, and individual differences accounted for 32.6% of the variance of ICT acceptance, which the regression analysis also showed. The social influence element was the most significant of these predictors. These findings correspond with literature on the role of peer support and collective culture in the tutors' technology acceptance (Galimova et al., 2024; Teo et al., 2012; Tsai, 2017; Venkatesh & Davis, 2000). Some individual differences, such as digital skills and confidence, also positively impacted outcomes (Huerta-Wong & Schoech, 2023; Yang et al., 2024; Alenezi et al., 2024). Meanwhile,

system characteristics produced a negative impact, perhaps due to infrastructural barriers endemic to Ghanaian CoEs (Smith et al., 2024; Kemp, 2024b). With respect to the actual use of ICT, only social and individual characteristics were able to predict outcomes, and together they accounted for 23.8% of the variance. What is notable, however, is that system characteristics, in their absence, shifts the focus to peer motivation and user skills (Ortega et al., 2022; Huerta-Wong & Schoech, 2023; Anamuah-Mensah et al., 2024). The results, as a whole, strengthen the TAM framework. It posits that for Ghanaian CoEs to incorporate ICT as a regular feature in their programs, they need to go beyond tackling infrastructural issues to enhancing peer support, improving instructional capacity, and fostering digital self-efficacy.

Conclusion

It can be deduced from the results that tutors at CoEs understand the advantages of employing ICT in their teaching as a result of the study. They understand that using ICT in teaching boosts student involvement, increases the efficacy of teaching, and cuts down on teaching hours. However, it is puzzling that the belief in ICT's importance does not correspond with its embracement within teaching practice. There are likely contextual obstacles that impede successful technology integration at CoEs. Aspects of social impact as well as personal factors are strong determinants of the acceptance and use of ICT in teaching. On the other hand, the features of the system are known to have a low acceptance of ICT, but have no impact on the use of ICT in teaching. In order to maximise the benefits of CoEs ICT integration at all levels of education, increasing base collaboration and peer support, systemic infrastructural barriers, and professional development training on CoEs tutors' skills enhancement are essential.

Statements and Declarations

Author contributions: Conceptualisation, methodology and data collection SOG, Data analysis, validation and original draft preparation WOA: All authors have read and agreed to the published version of the manuscript.

Funding: No funding was received to assist with the preparation of this manuscript. The authors have no relevant financial or non-financial interests to disclose.

Data availability: The data presented in this article are available within the text. Additional data can be requested from the corresponding author.
Conflict of interest: The authors declare no competing interests.

Ethics approval: The study was conducted in accordance with the ethics in educational research.

References

Abedi, E. A. (2023). Tensions between technology integration practices of teachers and ICT in education policy expectations: Implications for change in teacher knowledge, beliefs and teaching practices. *Journal of*

Computer Education, 11, 1215-1234. https://doi.org/10.1007/s40692-023-00296-6

Aboagye, E. (2021). Transitioning from face-to-face to online instruction in the COVID-19 era: Challenges of tutors at colleges of education in Ghana. *Social Education Research*, 2, 9-19. https://doi.org/10.37256/ser.212021545

Agyei, D. D. (2021). Integrating ICT into schools in Sub-Saharan Africa: From teachers' capacity building to classroom implementation. *Education and Information Technologies*, 26, 125-144. https://doi.org/10.1007/s10639-020-10253-w

Aidoo, B., & Chebure, A. (2024). Integrating ICT to adopt online learning in teacher education in Ghana. *Education Sciences*, *14*(12), 1313. https://doi.org/10.3390/educsci14121313

Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' perceptions of technology integration in teaching-learning practices: A systematic review. *Frontiers in Psychology*, *13*, 920317.

Akyeampong, K. (2017). Teacher educators' practice and vision of good teaching in teacher education reform context in Ghana. *Educational Research*, 46, 194-203. https://doi.org/10.3102/0013189X17711907

Alenezi, M., Al-Rodhan, W., & Abdullah, N. (2024). Exploring the role of attitudes, self-efficacy, and digital competence in influencing teachers' integration of ICT: A partial least squares structural equation modeling study. *Heliyon, 10*(14), e33456. https://doi.org/10.1016/j.heliyon.2024.e33456

Anamuah-Mensah, J., Mereku, K., & Ampiah, J. G. (2024). Context matters: Exploring teacher and learner contexts in ICT integration in slum public basic schools in Ghana. *Cogent Education, 11*(1), Article 2342637. https://doi.org/10.1080/2331186X.2024.2342637

Arkorful, V., Barfi, K. A., & Aboagye, I. K. (2021). Integration of information and communication technology in teaching: Initial perspectives of senior high school teachers in Ghana. *Education and Information Technologies*, 26, 3771-3787. https://doi.org/10.1007/s10639-020-10426-7

Arstorp, A.-T., Olofsson, A. D., & Lindberg, J. O. (2024). Professional digital competence in teacher education – where are we, where are we headed and how to get there? *Teachers and Teaching: Theory and Practice, 30*(4), 395–399. https://doi.org/10.1080/13540602.2024.2379845

Baidoo-Anu, D., Gyamerah, K., & Munezhi, M. (2023). Digital divide in higher education in Sub-Saharan Africa: Evidence from online learning during the COVID-19 pandemic. *SN Social Sciences*, 3, 122. https://doi.org/10.1007/s43545-023-00717-4

Benali, M., Bakrim, S., Abdel-Daim, M. M., & Kihal, A. (2024). Examining awareness, social influence, and perceived enjoyment in the TAM framework as determinants of ChatGPT. Personalization as a moderator. *Computers and Human Behavior Reports*, 15, 100421.

Boadu, B. S. (2024). Gender perspective on the study of information technology in schools in Ghana: The case of Ghana Communication Technology University. *African Journal of Inter/Multidisciplinary Studies*, 6, 1-11. https://doi.org/10.51415/ajims.v6i1.1291

Buabeng-Andoh, C. (2019). Factors that influence teachers' pedagogical use of ICT in secondary schools: A case of Ghana. *Contemporary Educational Technology*, 10, 272-288. https://doi.org/10.30935/cet.590099

Cabero-Almenara, J., Guillén-Gámez, F. D., Ruiz-Palmero, J., & Palacios-Rodríguez, A. (2021). Teachers' digital competence to assist students with functional diversity: Identification of factors through logistic regression methods. *British Journal of Educational Technology*, *52*(2), 670-687.

Chen, Y. L., Liu, E. Z. F., & Shih, R. C. (2023). Extending Technology Acceptance Model to higher-education students' use of digital academic reading tools on computers. *International Journal of Educational Technology in Higher Education*, 20(1), 1-21.

Das, K. (2019). Role of ict for better mathematics teaching. Shanlax International Journal of Education, 7(4), 19-28. https://doi.org/10.34293/education.v7i4.641

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.

Debrah, A., Yeyie, P., Gyimah, E., Halm, G. G., Sarfo, F. O., Mensah, T., & Vlachopoulos, D. (2021). Online instructional experiences in an unchartered field challenges of student-teachers of a Ghanaian College of Education. *Journal of Digital Learning in Teacher Education*, 37, 99-110. https://doi.org/10.1080/21532974.2021.1892553

Fernandes, G. W. R., Rodrigues, A. M., & Ferreira, C. A. (2020). Professional development and use of digital technologies by science teachers: A review of theoretical frameworks. *Research in Science Education*, 55, 673-708. https://doi.org/10.1007/s11165-018-9707-x

Fidan, M., Debbağ, M. ., & Çukurbaşı, B. (2020). Technology proficiency self-assessments of teachers becoming professional in the 21st century: A scale adaptation study. *Pegem Journal of Education and Instruction*, *10*(2), 465–492. https://doi.org/10.14527/pegegog.2020.016

Galimova, E. G., Oborsky, A. Y., Khvatova, M. A., Astakhov, D. V., Orlova, E. V., & Andryushchenko, I. S. (2024). Mapping the interconnections: A systematic review and network analysis of factors influencing teachers' technology acceptance. *Frontiers in Education, 9*, Article 1436724. https://doi.org/10.3389/feduc.2024.1436724

Ghomi, M., Noroozi, O., & Biemans, H. (2024). Mapping interconnections between social and individual factors influencing technology acceptance in teacher education: A network analysis approach. *Computers & Education, 205,* 104828. https://doi.org/10.1016/j.compedu.2023.104828

Graf-Vlachy, L., Buhtz, K., & König, A. (2018). Social influence in technology adoption: Taking stock and moving forward. *Management Review Quarterly, 68*(1), 37–76. https://doi.org/10.1007/s11301-017-0133-3

Gyampoh, A. O. (2020). Tutor perception on personal and institutional preparedness for online teaching-learning during the COVID-19 crisis: The case of Ghanaian Colleges of Education. *African Educational Research Journal, 8*(3), 511–518. https://doi.org/10.30918/AERJ.83.20.088

Gyane, S. O. J. (2021). Online teaching and learning–The voice of teachers in the colleges of education in Ghana. *Education and Sustainable Society*, 4, 7-10.

Holden, R. J., & Karsh, B. T. (2010). The technology acceptance model: Its past and its future in health care. *Journal of Biomedical Informatics*, 43(1), 159-172.

Huang, L., Chen, K., & Wu, J. (2023). Extending the Technology Acceptance Model (TAM) to predict university students' intentions to use metaverse-based learning platforms. *Education and Information Technologies*, 28(12), 15231-15254.

Huerta-Wong, J. E., & Schoech, R. (2023). Changes in early career teachers' technology use for teaching: The roles of teacher self-efficacy, ICT literacy, and experience during COVID-19 school closure. *Teaching and Teacher Education, 133*, Article 104251. https://doi.org/10.1016/j.tate.2023.104251

Ifenthaler, D., & Yau, J. Y. K. (2021). Technology acceptance of four digital learning technologies (classroom response system, classroom chat, e-lectures, and mobile virtual reality) after three months' usage. *International Journal of Educational Technology in Higher Education*, 18(1), 1-17.

Jia, R., Chen, Y., & Zhang, L. (2024). How do consumers make behavioural decisions on social commerce platforms? The interaction effect between behaviour visibility and social needs. Information Systems Journal, 34(2), 412-438.

Jimoyiannis, A. (2010). Designing and implementing an integrated technological pedagogical science knowledge framework for science teachers professional development. *Computers & Education*, 55, 1259-1269. https://doi.org/10.1016/j.compedu.2010.05.022

Kaminskienė, L., Järvelä, S., & Lehtinen, E. (2022). How does technology challenge teacher education? *International Journal of Educational Technology in Higher Education, 19*(64), 1–19. https://doi.org/10.1186/s41239-022-00375-1

Kebritchi, M., Lipschuetz, A., & Santiago, L. (2017). Issues and challenges for teaching successful online courses in higher education: A literature review. *Journal of Educational Technology Systems*, 46, 4-29. https://doi.org/10.1177/0047239516661713

Kemp, A. (2024a). Extending the Technology Acceptance Model for education: Toward an educational technology acceptance model (EETAM). *Computers & Education, 207,* 104851. https://doi.org/10.1016/j.compedu.2023.104851

Kemp, A. (2024b). Testing a novel extended educational technology acceptance model using student attitudes towards virtual classrooms. *British Journal of Educational Technology*, 55(3), 1234-1251

Koenig-Lewis, N., Marquet, M., Palmer, A., & Zhao, A. L. (2015). Enjoyment and social influence: Predicting mobile payment adoption. *The Service Industries Journal, 35*(10), 537–554. https://doi.org/10.1080/02642069.2015.1043278

Kothari. (2017). Research methodology methods and techniques by CR Kothari. *Published by New Age International (P) Ltd., Publishers*, *91*.

Kubuga, K. K., Ayoung, D. A., & Bekoe, S. (2021). Ghana's ICT4AD policy: Between policy and reality. *Digital Policy, Regulation and Governance*, 23, 132-153. https://doi.org/10.1108/DPRG-02-2020-0020

Kulviwat, S., Bruner, G. C., Kumar, A., Nasco, S. A., & Clark, T. (2009). The role of social influence on adoption of high tech innovations: The moderating effect of public/private consumption. Journal of Business Research, 62(7), 706-712.

Lawrence, J. E., & Tar, U. A. (2018). Factors that influence teachers' adoption and integration of ICT in teaching/learning process. *Educational Media International*, 55, 79-105. https://doi.org/10.1080/09523987.2018.1439712

Ministry of Education. (2015). ICT in education policy. Ministry of Education, Republic of Ghana. https://docs.edtechhub.org/lib/K24G4PWY

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017-1054.

Moradi, H. (2025). The role of language teachers' perceptions and attitudes in ICT integration in higher education EFL classes in China. *Humanities and Social Sciences Communications*, *12*, 208. https://doi.org/10.1057/s41599-025-04524-5

Msambwa, M. M., & Daniel, K. (2024). A systematic literature review on the ICT integration in teaching and learning: Lessons for an effective integration in Tanzania. *European Journal of Education*, *59*(4), e12696. https://doi.org/10.1111/ejed.12696

Mthembu, N., & Makondo, L. (2024). Technology integration in teacher education: challenges and adaptations in the post-pandemic era. *Discover Education*, *3*, 341. https://doi.org/10.1007/s44217-024-00341-1

Naluwooza, R., Ayeni, F., Langmia, K., & Mbarika, V. (2023). Fostering learning outcomes in a non-reading culture at foundational level of education: the role of information technology and pupil engagement. International Journal of Educational Management, 37(3), 558-574. https://doi.org/10.1108/ijem-03-2022-0111

Ngao, A. I., Sang, G., & Kihwele, J. E. (2022). Understanding teacher educators' perceptions and practices about ICT integration in teacher education program. *Education Sciences*, 12(8), 549. https://doi.org/10.3390/educsci12080549

Ortega, R., Silva, M., & Thompson, K. (2022). Digital innovation adoption in online community forums: A systematic analysis. Social Network Analysis and Mining, 12(1), 85-102.

Oubibi, M., Fute, A., Kangwa, D., Barakabitze, A. A., & Adarkwah, M. A. (2024). Interactive technologies in online teacher education in Africa: A systematic review 2014–2024. *Education Sciences*, *14*(11), 1188. https://doi.org/10.3390/educsci14111188

Prestridge, S. (2012). The beliefs behind the teacher that influences their ICT practices. *Computers & Education*, *58*(1), 449-458.

Sang, G., Valcke, M., van Braak, J., & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology. *Computers & Education*, *54*(1), 103-112.

Siddiq, F., Hatlevik, O. E., Olsen, R. V., Throndsen, I., & Scherer, R. (2022). Teachers' perceptions of technology integration in teaching-learning practices: A systematic review. *Frontiers in Psychology, 13*, Article 920317. https://doi.org/10.3389/fpsyg.2022.920317

Smith, A., & Johnson, B. (2024). External barriers to technology integration in social studies education. *Computers in the Schools, 41*(2), 156-178.

Smith, L., Johnson, P., & Rahman, A. (2024). Beyond usefulness and ease of use: Rethinking the Technology Acceptance Model for complex educational and healthcare contexts. *Journal of Educational Technology & Society, 27*(1), 45–59.

Teo, A. C., Tan, G. W., Ooi, K. B., & Lin, B. (2012). Can the demographic and subjective norms influence the adoption of mobile banking? International Journal of Mobile Communications, 10(5), 578-597.

Teo, T. (2011). Factors influencing teachers' intention to use technology: Model development and test. *Computers & Education*, *57*(4), 2432-2440.

Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. *Educational Technology Research and Development, 65*(3), 555-575.

Tsai, C. (2017). Technology adoption patterns in modern organizations. Organizational Behavior and Human Decision Processes, 141, 89-103.

Venkatesh, V., & Bala, H. (2008). Technology Acceptance Model 3 and a research agenda on interventions.

Decision Sciences, 39(2), 273–315. https://doi.org/10.1111/j.1540-5915.2008.00192.x

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46(2), 186-204.

Vongkulluksn, V. W., Xie, K., & Bowman, M. A. (2018). The role of value on teachers' internalization of external barriers and externalization of personal beliefs for classroom technology integration. *Computers & Education*, *118*, 70-81.

Wong, K. T. (2017). Evaluating the intention to use ICT collaborative tools in a social constructivist environment. *International Journal of Educational Technology in Higher Education*, 14(1), 1-14.

Yang, J., Li, Y., Chen, X., Zhang, W., & Liu, S. (2025). The role of language teachers' perceptions and attitudes in ICT integration in higher education EFL classes in China. *Humanities and Social Sciences Communications, 12*, Article 4524. https://doi.org/10.1057/s41599-025-04524-5

Zaker, A., & Nosratinia, M. (2021). Development and validation of a quantitative research literacy questionnaire. *International Journal of Foreign Language Teaching and Research*, *9*(37), 11–30.

Zhao, Y., Pinto Llorente, A. M., & Sánchez Gómez, M. C. (2022). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. *Computers & Education, 182*, Article 104454. https://doi.org/10.1016/j.compedu.2022.104454

Author Information

Wilson Osafo Apeanti
https://orcid.org/0000-0001-9264-5006
University of Education
Winneba
Ghana
Contact e-mail: *woapeanti@uew.edu.gh*

Solomon Ofori Gyane Jnr
https://orcid.org/0000-0001-6304-9424
Abetifi Presbyterian College of Education
Ghana