Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

Original Article

Pre-service Teachers' Willingness to Integrate Technology into Teaching in a Teacher Education University in Ghana

Seth Dade ANSAH[1]

[1]Department of Educational Foundations, School of Education and Life-Long Learning, University of Education, Winneba. Ghana

Correspondence: sdansah@uew.edu.gh / dadeansah@gmail.com

Abstract

The study sought to predict the intention to integrate technology based on contextual knowledge from teacher trainees of a teacher training university in Ghana. The study used a descriptive survey design. A total sample of 345 male and female trainee teachers were involved in the study. The sampling technique adopted was the census, which gave equal opportunity to all 2,000 level 400 students. The study used a structured questionnaire for data collection. Data analysis was done using correlational and inferential statistical analysis. The results revealed that there was a perfect positive correlation between all contextual variables and intent to integrate technology into instruction. Further, it was revealed that the six contextual factors, singularly and collectively positively predict the intention of the teacher trainees to integrate technology. It was concluded that teacher education programmes should focus on improving belief systems of teacher trainees to promote effective technology integration in education. By addressing the contextual factors, teacher training programmes can better prepare pre-service teachers to meet the demands of 21st-century teaching and learning environments.

KEYWORDS: Behavioural Beliefs, Normative Beliefs, Control Beliefs, Attitudes, Subjective Norms, Perceived Behavioural Control, and Intention

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

1.0 INTRODUCTION

Advancements in Information and Communication Technology (ICT) have been accelerating with high speed for data processing and with greater efficiency in all aspects of human life. In the field of education, rapid change in ICT continues to promote education delivery and facilitate learning (Ali & Maksum, 2020; Lange et al., 2020). In this information age, digital dominance keeps spreading its tentacles to all aspects of human endeavours and educational systems must respond with the needed speed. Technology integration could contribute to the achievement of 21st-century educational goals (critical thinking, communication, problem-solving, and collaboration).

Technology appeals to the present generation of students, who were born into the digital age and are familiar with using digital content in their daily activities both inside and outside the classroom. When instructors employ technology, they are likely to obtain and engage these students' interest and attention for meaningful learning. Technology can improve the effectiveness of instruction by allowing instructors to break down abstract concepts into simpler concepts through innovative ways. Instructors can employ multimedia tools like pictures, videos, and simulations to explain complex concepts. Technology can be used to chunk instruction and adapt learning experiences to individual student needs. With various adaptive apps, software, and devices, teachers can create personalised learning paths that engage and challenge all manner of learners. The advantages of technology integration are so wide in scope to the extent that technology can facilitate communication and collaboration among students and teachers. By using online platforms, students can collaborate on projects, share ideas, and work together irrespective of their geographical locations. Additionally, by using technology, teachers can perform administrative tasks, such as attendance, grading, and data tracking, allowing more time to focus on instruction and student engagement.

Modern literature in education shows that technology integration in teaching can enhance student engagement, facilitate a more personalised learning experience, and promote critical thinking and creativity. The use of technology can support the dissemination of information, facilitate communication, and provide access to a wide range of educational resources. With the increasing emphasis on digital literacy, technology integration can help students develop technological skills that are essential in the workplace of the 21st century workplace. However, it is important to note that technology should be used as a tool to improve learning, not as a replacement for traditional teaching methods. Teachers must be trained in how to effectively incorporate technology into their lessons and ensure digital equity so that all students have equal access to technology. In general, modern literature suggests that the integration of technology in teaching can have a positive impact on student learning outcomes when used appropriately and effectively.

Integration of technology in education in Ghana is gradually gaining popularity with the increasing availability of technology and the efforts of the government to promote digital literacy in education. The government has implemented various initiatives such as the National Digital Literacy Programme, the Ghana Open Data Initiative, and the Ghana Library Authority E-Resources Project to promote the use of technology in learning. Many schools and universities in Ghana have started to incorporate technology into their teaching practices, such as the use of

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

interactive whiteboards, digital textbooks, and online learning platforms. Some institutions, such as University of Education, Winneba (UEW) and Kwame Nkrumah University of Science and Technology and all universities running distance programmes in Ghana, have established e-learning platforms to facilitate remote learning and increase access to education. Teacher education universities offer courses in technology and its integration into teaching and learning.

However, access to technology remains a challenge in Ghana, especially in rural areas. There is also a shortage of technologies such as laptops and tablets as well as the required software. Coupled with this, teachers are not always equipped with the necessary digital skills to integrate technology into their teaching practices. Despite these challenges, efforts are being made to bridge the digital divide and promote technology integration in teaching at all levels of education in Ghana.

1.1 Literature Review

Integrating technology into education is a global endeavour, with various regions implementing strategies to enhance learning outcomes. Studies from different parts of the world (Bugti, Sarhandi & Bugti, 2024) provide insights into the challenges and successes of technology integration in education. In Africa, the integration of ICT in education has been a pivot in enhancing learning experiences. Countries like South Africa and Egypt have made significant progress through enabling policy environments and supportive institutional structures (World Bank, 2015). These efforts have improved the ICT integration in educational systems. However, UNESCO (2023a) indicated that challenges persisted in rural and underserved areas where access to technology and reliable infrastructure is inadequate, although there had been initiatives such as the "ICT Transforming Education in Africa" project to address these issues by promoting human and social development through the use of ICT in education.

In Southeast Asia, digital technologies have been recognised for their ability to transform education and meet the region's development objectives. The rapid growth in digital technology applications has led to various initiatives aimed at integrating technology into educational practices. However, disparities in access and readiness among countries pose challenges to uniform implementation (UNESCO, 2023b). The integration of generative artificial intelligence in education has also emerged as a transformative strength in the Asia-Pacific region, presenting both opportunities and challenges for educational systems. Debates surrounding its role, ethical use, and disparities in readiness among countries create a nuanced landscape for technology integration in education (UNESCO, 2023c).

Latin American countries have recognized the importance of integrating technology in education to align with the demands of a rapidly changing global market. Efforts include the development of open educational resources and massive open online courses to reach adults in need of training. However, challenges such as diverse linguistic backgrounds, varying levels of technological infrastructure, and limited access to professional development for educators impede effective implementation (OECD, 2020). Despite these challenges, the integration of technology in higher education is seen as essential for empowering the next generation of professionals, equipping them with the skills and competencies to succeed in a digitally-driven world (Higher Education Digest, 2023).

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

The role of the teacher is central in all educational delivery systems. The roles have significantly changed in the new paradigm of instruction. According to Reigeluth (2016), these, among others, include a designer of student work, a facilitator of the learning process, and a caring mentor. In addition, there are new roles for technology to make the new paradigm of instruction effective and efficient. Among others, these roles include record keeping for students' learning, instructions for students' learning and assessments for/of students learning (Reigeluth & Carr-Chullman, 2009; Reigeluth et al., 2008).

Teaching and learning take place within a context. The already complex context could be further complicated when incorporating technology to facilitate learning (Foulger, Buss & Su, 2021). Many inter-related contextual factors are linked to influence a teacher's quest to integrate technology. Among such packages are attitude about using technology, teacher beliefs about the usefulness of technology, the ease with which teachers can use technology, access to technology, teacher training, and teacher self-efficacy. These factors are supposed to be taken care of under the teacher training programme. The instructor is a key actor in the instructional space. Instructors make a series of judgements within instructional space/context (Gibson, 1979).

The instructor roles have changed over time (era). The post-industrial paradigm of instruction created new roles for instructors. These new roles according to Reigeluth (2016) include many roles such as a designer of student work, a facilitator of the learning process, and mentor; and as a guide on the side (King, 1993). Integrating technology enables teachers to perform such roles successfully. Because of this, Teacher Educator Technology Competencies (TETCs) (Foulger et al., 2017) and the Technological Pedagogical Content Knowledge (TPACK) framework (Koehler & Mishra, 2008; Mishra & Koehler, 2006; Mishra, 2019) have become a significant model for teacher training programmes. The TPACK sees to preparation of teachers as blending technological, pedagogical, and content knowledge.

The trainee teachers under study received training in various subject areas, also known as content knowledge (CK); knowledge in the art and science of teaching and learning (PK); and knowledge in the integration of appropriate technologies (TK). In addition, their training covers how to blend all three types of knowledge within a dynamic context (XK). Contextual factors such as institutional, interpersonal, intrapersonal, and technological factors (Koh et al., 2014) could influence a teacher's willingness and ability to integrate technology. When they graduate, the would-be teachers will find themselves in the contemporary teaching space that contains modern technologies as a context. There would be the need to decide how to manipulate this technology-rich space to facilitate learning. The Gibson (1979) concept of affordances comes into play to explain teacher trainees with technology in teaching practices that integrate technology. Researchers have used Gibson's affordances to come out with words such as use and usefulness (McGrenere & Ho, 2000), which have informed the studies of other researchers on technology and its use by humans (Teo, 2015; Venkatesh, et al., 2003).

In addition, studies of contextual factors bring into perspective Ajzen's (1985) Theory of Planned Behaviour (TPB) as a useful model. The TPB is considered a useful model for reasons such as providing an opportunity to assess the intention to integrate technology and also accounting for

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

selected contextual variables, such as the behavioural beliefs, attitudes, teacher-trainee perceptions of the usefulness of technology, and self-efficacy for integrating technology into their instructional activities. The theoretical framework offered by TPB could well be situated to account for important contextual factors that influence the perspectives about using technology in their profession. The Decomposed Theory of Planned Behaviour (DTPB; Sadaf, & Gezer, 2020; Sadaf, et al., 2016) is further reviewed to theoretically conceptualise the context as a theory that extended Ajzen's (1985) TPB to measure factors related to technology integration. In the DTPB, the constructs focus on technology issues. An examinable model for XK arrived to measure the various dynamics of XK and the intention of teacher-trainees to integrate technology into their profession. In doing so, the behavioural beliefs became three categories focused on technology: perceived usefulness of technology to their situation (PU), perceived ease of use of technology (PEU), and compatibility of technology with current values and needs. To examine the various variables, their relations, and their impact on the intention of integrating technology into instruction, a structural equation model was employed to examine the XK model.

Tailoring technological solutions to fit local contexts and languages enhances their effectiveness. Enabling policies and robust infrastructure are foundational for successful technology integration. Access and Equity are good, ensuring equitable access to technology, especially in underserved areas, remains a global challenge. But Teacher Training remain supreme, initial training and continuous professional development are crucial for educators to effectively incorporate technology into their teaching practices.

1.2 The Purpose of the Study

The purpose of this study was to establish the influence of contextual knowledge on the intention of teacher trainees to integrate technology into their teaching profession in Ghana. The study was guided by two research questions.

1.3 Research Questions

The following research questions guided the study:

1. What relationships exist among beliefs (behavioural, normative, and control) for technology integration?
2. How do contextual factors influence intentions to integrate technology into instruction?

2.0 METHODS

2.1 Participants

This study employed a descriptive survey design (Johnson & Christensen, 2008; Creswell & Clark, 2015) that involved using a self-reporting online questionnaire allowing the collection and analysis of quantitative data from all of the tertiary students from a university. The population of the study consisted of all the 2022 final-year teacher-trainees in UEW, who had gone through courses on content area, pedagogy and as well gone through teaching practice. Eventually, from a population

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

of 2000, a sample of 345 teacher-trainees was drawn out of those who opted to complete the research instrument. Census sampling was used as the researcher contacted all participants on their social media platforms and allowed all of them to take part in the study. The set of online questionnaires (Google Forms) used for this study was an adaption of the Intention to Teach with Technology (IT^2) Survey. The elements of the IT^2 Survey, originally based on the DTPB, were adapted by the researcher to assess the observed variables that were related to seven covert variables (behavioural, normative, and control beliefs, as well as attitudes, subjective norms, perceived behaviour control, and intention to use technology) in the teaching internship.

2.2 Data Collection Instrument

The instrument used for this study was a self-reporting questionnaire adapted by the researcher. This set of online questionnaires (Google Forms) items was based on the research objectives. The adaption was necessary to cater for cultural and contextual differences in respondents. Items were modified to address technological gaps, local contexts and language difference. The introductory section of the questionnaire explained the study's objective, sought the respondents' collaboration, and thanked them for participation. The first sub-section of the questionnaire elicited information on the respondents' demography. The other subsections were based on items of the IT^2 survey, it entailed the DTPB, and were constructed to assess observed variables that were related to seven latent variables, including behavioural, normative, and control beliefs, as well as attitudes, subjective norms, perceived behavioural control, and intention to use technology in the classroom.

In total, 56 items were used in the final version of the IT2 Survey. These items represented 18 observed parcels, consisting of 2 to 6 items each. Examples of items were, “Integrating technology into my classroom instruction will fit well with the way that I teach,” “When I am a certified classroom teacher, students will expect me to integrate technology into my classroom instruction,” and “Access to computer technology and software/applications will support my ability to integrate technology into my classroom instruction.” Consistent with Ajzen’s approach, participants responded to items on a 7-point scale. The anchors of the scales varied and included pairs such as 7 = Extremely Easy to 1 = Extremely Difficult; 7 = True to 1 = False; 7 = Extremely Likely to 1 = Extremely Unlikely, and 7 = Strongly Agree to 1 = Strongly Disagree. These items constituted 18 parcels, which served as the observed variables in the exploratory and confirmatory factor analyses. For example, items 1–4 formed ATT1, attitude parcel 1; and items 5–7 composed ATT2, attitude parcel 2. A set of demographic questions is embedded at the end of the IT2 Survey.

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

3.0 RESULTS

3.1 Research Question One: What relationships exist among beliefs (behavioural, normative, and control) for technology integration?

To answer this first research question, correlational analysis was conducted, and the results are shown in Table 1. The correlation coefficient (r) measures the direction and strength of the relationship between two variables (Kapp et al., 2023). In this case, it examines the contextual factors of technology integration and intent to integrate technology in Instruction. According to Kapp et al. (2023), the correlation coefficient ranges from -1.00 (perfect negative) to +1.00 (perfect positive). The strength of the relationship is classified as Very strong: ±0.90 to ±0.99; Strong: ±0.70 to ±0.89; Moderate: ±0.50 to ±0.69; Weak: ±0.30 to ±0.49; Small: ±0.01 to ±0.29; and a coefficient of 0.00 indicates no relationship. Based on this scale, data in Table 1 aim to determine whether there are significant relationships among contextual factors of Technology Integration and the intention to integrate technology in instruction.

Table 1: Correlation among the contextual factors of Technology Integration

Variable	BB	NB	CB	ATTs	SN	PBC	INT
BB	1	0.655	0.685	0.525	0.417	0.762	0.601
		0.000	0.000	0.000	0.000	0.000	0.000
NB	0.655	1	0.511	0.548	0.700	0.424	0.387
	0.000		0.000	0.000	0.000	0.000	0.000
CB	0.685	0.511	1	0.195	0.564	0.400	0.308
	0.000	0.000		0.000	0.000	0.000	0.000
ATTs	0.528	0.548	0.195	1	0.299	0.585	0.517
	0.000	0.000	0.000		0.000	0.000	0.000
SN	0.417	0.700	0.564	0.299	1	0.258	0.342
	0.000	0.000	0.000	0.000		0.000	0.000
PBC	0.762	0.424	0.400	0.585	0.258	1	0.702
	0.000	0.000	0.000	0.000	0.000		0.000
INT	0.601	0.387	0.308	0.517	0.342	0.702	1
	0.000	0.000	0.000	0.000	0.000	0.000	

p-value ≤ 0.05

Source: *Author's computation using SPSS Software 20.0*

Were there significant relationships among those variables? The null hypothesis of the test could be that there were no significant relationships between the contextual factors of technology

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

integration and intent to integrate technology in Instruction. The results indicate that there is a perfect positive correlation between all contextual variables and intent to integrate technology in instruction. Behaviour has a moderately significant positive correlation with normative behaviour (r = 0.655, P = 0.000) and control behaviour (r = 0.685, P = 0.000). Furthermore, behaviour further had a moderate positive significant correlation with ATTs (r = 0.525, P = 0.000), but a weak positive significant correlation with subjective normative behaviour (r = 0.417, P = 0.000). The data further indicates that behaviour had a strong positive significant correlation with PBC (r = 0.762, P = 0.000) and a moderate positive significant correlation with INT (r = 0.601, P = 0.000).

The data also indicate that NB has a moderate positive significant correlation with BB (r = 0.655, P = 0.000), CB (r = 0.511, P = 0.000), ATTs (r = 0.548, P = 0.00) and a strong positive significant correlation with SN (r = 0.700, P = 0.000), but a weak positive significant correlation with PBC (r = 0.424, P = 0.00) and INT (r = 0.387, P = 0.00).

Table 1 further indicates that CB had a moderate positive significant correlation with BB (r = 0.685, P = 0.000), CB (r = 0.511, P = 0.000), SN (r = 0.564, P = 0.000), but a weak positive significant correlation with PBC (r = 0.400, P = 0.000) and INT (r = 0.308, P = 0.001) and a small positive significant correlation with ATTs (r = 0.195, P = 0.000).

ATTs have a moderate positive significant relationship with BB (r = 0.528, P = 0.00), NB (r = 0.548, P = 0.001), PBC (r = 0.585, P = 0.000) and INT (r = 0.517, P = 0.000), but a small positive significant relationship with CB (r = 0.195, P = 0.001) and SN (r = 0.299, P = 0.001). SN has a strong positive significant relationship with NB (r = 0.700, P = 0.00), a moderate positive significant relationship with CB (r = 0.564, P = 0.000), a weak positive significant relationship with BB (r = 0.417, P = 0.000), a weak positive significant relationship with INT (r = 0.342, P = 0.000), but a small positive significant relationship with ATTs (r = 0.299, P = 0.000) and PBC (r = 0.258, P = 0.000).

The data further indicate that PBC has a strong positive significant correlation with BB (r = 0.762, P = 0.000) and INT (r = 0.702, P = 0.000), a moderate positive significant correlation with ATTs (r = 0.585, P = 0.000), but a weak positive significant correlation with NB (r = 0.424, P = 0.000) and CB (r = 0.400, P = 0.000) and a small positive significant correlation with SN (r = 0.258, P = 0.000). INT has a moderate positive significant correlation with BB (r = 0.601, P = 0.000) and ATTs (r = 0.517, P = 0.000), but a weak positive significant correlation with NB (r = 0.387, P = 0.000), CB (r = 0.308, P = 0.000) and SN (r = 0.342, P = 0.000), and a strong positive correlation with PBC (r = 0.702, P = 0.000).

After comparing the Pearson r and the significance level of each component of the contextual variables, it was found that there is a significant positive relationship between the contextual variables and the intent to integrate Technology in Instructional delivery. Based on the study, the null hypothesis is rejected, concluding that there is a significant positive relationship between

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

contextual variables and Trainees intent of the trainees to integrate Technology in Instructional delivery.

3.2 Research Question Two: How do contextual factors influence intentions to integrate technology into instruction?

In an attempt to answer this second research question, regression analysis was performed and the results are shown in Table 2.

Model (1) Dep. Var.: D(INT)

Predictor	Estimate	SE	t	P-Value (Sig)
C	0.707	0.606	1.169	0.243
BB	0.369	0.110	3.344	0.001
NB	-0.139	0.048	-2.891	0.004
CB	-0.108	0.038	-2.825	0.005
ATTs	0.280	0.102	2.740	0.006
SN	0.147	0.029	5.024	0.000
PBC	0.368	0.049	7.557	0.000

p-value ≤ 0.05
Source: Researcher's Computation Using Jamovi 2.3.24 Software

In Table 2, the influence of contextual factors on intentions to integrate technology into instruction was investigated. The results show a significant positive relationship between contextual factors and intentions to integrate technology into instruction. This suggests that a unit positive change in BB by Teacher Trainees will significantly correspond to a 0.369 (36.9%) positive change in their intentions to integrate technology into instruction. In other words, an increase in BB by teacher trainees will significantly increase trainee teachers' intentions to integrate technology into instruction. Data also indicate that a unit change in NB from teacher trainees will significantly decrease the desire to improve their intentions to positively integrate technology into instruction by approximately -0.139 (13.9%). The data further indicate that a unit positive change in CB by

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

trainee teachers will significantly correspond to a decrease of -0.108 (10.8%) in their intentions to integrate technology into their instructions.

Table 2, also indicates that a unit change in ATTs by Teacher Trainees will lead to a 0.280 (28.0%) increase in their intentions to integrate technology into their instructions and vice versa. This suggests that as teacher trainees' ATTs increase, then their ability and urge to increase technology integration in their instructions also significantly and tremendously increase as well. Data further indicate that as teacher trainees' SN changes by one unit, their intentions to integrate technology into their classroom will significantly increase by 0.147 (14.7%). This further suggests that as your SN decreases by a unit, the intentions to integrate technology in their instructions will also decrease significantly by 0.147 (14.7%). Finally, the data indicate that a unit change positively in Teacher Trainees' PBC will significantly lead to a significant positive change in their urge and ability to integrate technology in their instructions by a positive significant improvement of 0.368 (36.8%).

4.0 DISCUSSION

The findings of this study reveal a significant positive relationship between behavioural beliefs, normative beliefs, and control beliefs among pre-service teachers in Ghana. In other words, the presences of factors such as teacher trainees' belief in technology having a great deal of solution to their classroom delivery and trainees regarding technology to require seamless effort to be manipulated in the cause of their delivery, also manifest itself in the presence of future influence from their headteacher, future influence from co-teachers and future influence from pupils. These relationships suggest that pre-service teachers' willingness to integrate technology into their teaching is influenced by a combination of personal beliefs about the usefulness and ease of use of technology (behavioural beliefs), the expectations of significant others (normative beliefs), and their perceived control over technology integration (control beliefs).

The high correlation between behavioural beliefs and control beliefs ($r = 0.685$) indicates that pre-service teachers who perceive technology as useful and easy to use also feel more confident in their ability to integrate it into their teaching practices. This aligns with the Technology Acceptance Model (TAM), which posits that perceived usefulness and perceived ease of use are critical determinants of technology adoption (Davis, 1989). The strong relationship between normative beliefs and control beliefs ($r = 0.511$) further underscores the importance of social influences and perceived behavioural control in shaping pre-service teachers' intentions to use technology in the classroom.

The positive correlation between these belief systems is consistent with previous studies that have explored factors influencing technology integration among teachers. For example, Teo (2010) found that perceived usefulness and perceived ease of use were significant predictors of teachers' intentions to use technology in teaching, a finding that is mirrored in this study. Similarly, Ajzen (1991) emphasised the role of normative beliefs in shaping intentions, which is supported by the

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

significant correlation between normative beliefs and intentions to integrate technology in this study.

The regression analysis further reveals that perceived behavioural control (PBC) is the strongest predictor of intention to integrate technology, with a beta value of 0.478. In other words, pre-service teachers' self-efficacy in application of technologies, availability of technologies and availability of other instructional materials will highly predict whether pre-service teachers would integrate technologies in their future practice or not. This finding is in line with the Theory of Planned Behaviour (TPB), which posits that individuals are more likely to perform a behaviour when they feel they have the necessary resources and opportunities to do so (Ajzen, 1991). The significant contribution of PBC to predicting intentions suggests that enhancing pre-service teachers' confidence and perceived control over technology use is crucial for promoting technology integration in education.

4.1 Recommendations/ Implications for Teacher Training

These findings have important implications for teacher training programmes in Ghana and similar contexts. Given the strong influence of behavioural and control beliefs on technology integration, teacher training programmes should focus on enhancing pre-service teachers' perceived usefulness and ease of use of technology. This could be achieved through hands-on training sessions that allow pre-service teachers to explore and practice using various educational technologies. Additionally, fostering a supportive environment where normative beliefs about technology use are positive and encouraging can further enhance pre-service teachers' intentions to integrate technology in their future classrooms.

Furthermore, the significant role of perceived behavioural control highlights the need for teacher education programmes to equip pre-service teachers with the skills and resources they need to feel confident in their ability to integrate technology. This could involve providing access to up-to-date technological tools, offering continuous professional development opportunities, and creating a supportive community of practice where pre-service teachers can share experiences and strategies for technology integration.

4.2 Limitations and Future Research

Although this study provides valuable insights into the factors influencing pre-service teachers' willingness to integrate technology, it is important to acknowledge its limitations. The study is based on self-reported data, which may be subject to biases such as social desirability bias. Additionally, the study's focus on a single institution may limit the generalisability of the findings to other contexts. Future research could explore the influence of other contextual factors, such as institutional support and access to technology, on pre-service teachers' technology integration intentions. Longitudinal studies that track pre-service teachers' technology integration practices

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

over time would also provide deeper insights into the long-term impact of teacher training programmes on technology use in the classroom.

4.3 Conclusion

In conclusion, this study highlights the importance of behavioural beliefs, normative beliefs, and control beliefs in shaping pre-service teachers' intentions to integrate technology into their teaching. The findings suggest that teacher education programmes should focus on enhancing these belief systems to promote effective technology integration in education. By addressing these factors, teacher training programmes can better prepare pre-service teachers to meet the demands of 21st-century teaching and learning environments.

LIST OF ABBREVIATIONS:

Attitude (ATT)
Attitude2 (ATT2)
Behavioural beliefs (BB)
Compatibility (COMP)
Content Knowledge (CK)
Context Knowledge (XK)
Control beliefs (CB)
Decomposed Theory of Planned Behaviour (DTPB)
Facilitating conditions resources (FCR)
Information and Communication Technology (ICT)
Intention (INT)
Intention to Teach with Technology (IT^2)
Normative beliefs (NB)
Parent influences (ParInf)
Pedagogical Knowledge (PK)
Peer Teacher influences (PrInf)
Perceived usefulness (PU)
Perceived ease of use (PEU)
Perceived Behavioural Control (PBC)
Student influences (StInf)
Supervisor influences (SupInf)
Subjective norms (SN)
Technological Knowledge (TK)
Teacher Educator Technology Competencies (TETCs)
Technological Pedagogical Content Knowledge (TPACK)
Theory of Planned Behaviour (TPB)

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

DELCARATION

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The author declares that there are no competing interests.

Funding: Not applicable

Authors' contribution: I declare that this article was solely done by me.

Acknowledgements: I wish to express my profound gratitude to all the students who participated in the study. I also express gratitude to Teresa S. Foulger and co for permission to use their support to use their Intention to Integrate Survey. I wish to thank the management of the University of Education, Winneba, Ghana, for permitting me to conduct and use their students for the study.

REFERENCES

Ajzen, I. (1985). From intentions to actions: A theory of planned behaviour. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behaviour* (pp. 11–39). Springer. https://doi.org/10.1007/ 978-3-642-69746-3_2

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes*, 50(2), 179-211.

Ali, M. K., & Maksum, H. (2020). Utilization of e-learning-based ICT learning using the Google Classroom application during the COVID-19 pandemic. *Journal of Education Research and Evaluation, 4*(4), 373. https://doi.org/10.23887/jere.v4i4.29181

Bugti, F., Sarhandi, P. S. A., & Bugti, S. M. (2024). A Qualitative Study on Challenges and Opportunities for Technology Integration in Pedagogy. *Journal of Development and Social Sciences. 5(3). 100-109. https://doi.org/10.47205/jdss.2024(5-III)10*

Creswell, J. W., & Plano Clark, V. (2015). *Designing and conducting mixed methods research* (2nd ed.). Thousand Oaks, CA: Sage.

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

Field, A. (2018). Discovering statistics using IBM SPSS Statistics.

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

Foulger, T. S., Graziano, K. J., Schmidt-Crawford, D., & Slykhuis, D. A. (2017) Teacher educator technology competencies. *Journal of Technology and Teacher Education, 25*(4), 413-448. www.learntechlib.org/p/181966/

Gibson, J. J. (1979). *The ecological approach to visual perception*. Houghton Mifflin.

Higher Education Digest. (2023). *Harnessing technology for educational excellence and global competence in Latin America*. Higher Education Digest. https://www.highereducationdigest.com/harnessing-technology-for-educational-excellence-and-global-competence-in-latin-america

Johnson, B., & Christensen, L. (2008). Educational Research: Quantitative, qualitative and mixed approaches (3rd ed.). Thousand Oaks, California: Sage Publications.

Kapp, A., Hansmeyer, J., & Mihaljević, H. (2023). Generative models for synthetic urban mobility data: A systematic literature review. *ACM Computing Surveys*, *56*(4), 1-37.

King, A. (1993). From Sage on the Stage to Guide on the Side. College Teaching, 41(1), 30–35.

Koehler, M. J., & Mishra, P. (2008). Introducing TPCK. In AACTE Committee on Innovation and Technology (Ed.), *The handbook of technological pedagogical content knowledge (TPCK) for educators (pp. 3-29). New York, NY: American Association of Colleges of Teacher Education and Routledge.*

Koh, J. H. L., Chai, C.S. Lai, & Tay, L. Y. (2014). TPACK-in-Action: Unpacking the contextual influences of teachers' construction of technological pedagogical content knowledge (TPACK). *Computers & Education, 78*, 20–29. https://doi.org/10.1016/j.compedu.2014.04.022

Lange, S., Pohl, J., & Santarius, T. (2020). Digitalization and energy consumption. Does ICT reduce energy demand? *Ecological Economics*, *176*. https://doi.org/10.1016/j.ecolecon.2020.106760.

McGrenere, J., & Ho, W. (2000). Affordances: Clarifying and evolving a concept. In S. Fels & P. Poulin (Eds.), *Proceedings of Graphic Interfaces 2000* (pp. 179–186). https://doi.org/10.20380/GI2000.24.

Mishra, P. (2019). Considering contextual knowledge: The TPACK diagram gets an upgrade. *Journal of Digital Learning in Teacher Education, 35*(2), 76–78. https://doi.org/10.1080/21532974.2019.1588611.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1055. http://citeseerx.ist.psu.edu/viewdoc/ download? 10.1.1.523.3855&rep=rep1&type=p

Ansah (2025), Vol. 6, Iss. 1, Pg. 53-67
https://doi.org/10.5281/zenodo.15089389

Organisation for Economic Co-operation and Development (OECD). (2020). *Making the most of technology for learning and training in Latin America*. OECD Publishing. https://www.oecd.org/content/dam/oecd/en/publications/reports/2020/06/making-the-most-of-technology-for-learning-and-training-in-latin-america_4029c655/ce2b1a62-en.pdf

Sadaf, A., & Gezer, T. (2020). Exploring factors that influence teachers' intentions to integrate digital literacy using the decomposed theory of planned behaviour. *Journal of Digital Learning in Teacher Education, 36*(2), 124–145.

Sadaf, A., Newby, T. J., & Ertmer, P. A. (2016). An investigation of the factors that influence preservice teachers' intentions and integration of Web 2.0 tools. *Educational Technology Research and Development, 64*(1), 37–64. https://doi.org/10.1007/s11423-015-9410-9

Teo, T. (2010). Attitudes toward technology and intentions to use technology: A structural equation modeling approach. *British Journal of Educational Technology*, 41(6), 899-907.

Teo, T. (2015). Comparing pre-service and in-service teachers' acceptance of technology: Assessment of measurement invariance and latent mean differences. *Computers & Education, 83*(1), 22–31. https:// doi.org/10.1016/j.compedu.2014.11.015

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478. http://www.jstor.com/stable/30036540

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2023a). *ICT transforming education in Africa*. UNESCO. https://www.unesco.org/en/digital-education/kfit-africa

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2023b). *Digital learning in Southeast Asia: Towards enabling policies for education transformation*. UNESCO. https://www.unesco.org/gem-report/en/2023-southeast-asia

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2023c). *How generative AI is reshaping education in Asia-Pacific*. UNESCO. https://www.unesco.org/en/articles/how-generative-ai-reshaping-education-asia-pacific

World Bank. (2015). *ICTs and education in Africa: A summary report on the opportunities and challenges for digital learning in Africa*. World Bank Group. https://documents1.worldbank.org/curated/en/154231468202165073/pdf/882270WP0Box380CT0Education0summary.pdf