UNIVERSITY OF EDUCATION, WINNEBA

The role of social influence, System characteristics, and Individual differences in the acceptance and use of ICT tools for teaching at Colleges of Education

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DECLARATION

CANDIDATE'S DECLARATION

I, Solomon Ofori Gyane Jnr., hereby declare that this dissertation, except for quotations and references contained in published works, which have all been identified and acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

…… ……

SOLOMON OFORI GYANE JNR DATE:

Supervisor's Declaration

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis as laid down by the University of Education, Winneba.

……. ……

WILSON OSAFO APEANTI (PhD) DATE:
(Principal Supervisor)

DEDICATION

This dissertation is dedicated to all the MATTHEW MENSAH GYANE'S family.

ACKNOWLEDGEMENTS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This study examined how social influence, system features, and individual traits affect the acceptance and utilisation of ICT tools such as PowerPoint, telegram, WhatsApp and others in teaching at Ghanaian Colleges of Education. A sample of one hundred and nine (109) tutors was randomly selected from 46 Colleges of Education in Ghana. Participants received both printed and online questionnaires to collect their responses. Data analysis was performed using the Statistical Package for the Social Sciences with respect ANOVA, regression, multiple linear regression, descriptive statistics, principal component analysis. The study demonstrated a strong acceptance and utilisation of ICT tools such as PowerPoint, telegram, WhatsApp and others among college instructors. Key factors such as social Influence, "System Characteristics," and "Individual Differences" significantly impact how these tutors embrace and implement ICT tools in their educational methods. Additionally, the incorporation of ICT tools into teaching led to better outcomes for tutors. The research highlights the necessity of equipping tutors with the right resources and providing training to enhance their effective use of ICT tools such as PowerPoint, telegram, WhatsApp others. To reduce the reliance on regular training for college tutors, it's essential that all new tutors have foundational ICT skills, which should include troubleshooting hardware, installing software, and accurately managing hardware and software components.

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter outlines the research work, focusing on the background of the study, the problem statement, and the purpose and significance of the research. It also includes the research objectives and the questions that guided the study. Additionally, the chapter addresses the research limitations and the organisational plan, along with definitions of key terms used throughout the study.

1.1 Background of the Study

Rapid technological innovation and globalisation have significantly impacted developing a new knowledge-based economy in the contemporary world. Technology, particularly ICT, is the determining force in this global knowledge-based economy. Most governments, particularly those in developing nations, acknowledge that technological progress significantly impacts the socioeconomic growth of their citizens. Based on this impact, several governments have made substantial technological advancements to establish the human capital necessary to meet the expectations and pressures of the contemporary information and digital era.

Since World War II, the transformative potential of digital technology tools has been harnessed in the US, integrating equipment such as audiotapes, television, and slide ICT tools in the classroom (Ibrahim et al., 2022). Over the past decade, this trend has accelerated, with technology and software related to computers increasingly integrated into education. This integration not only enhances access to higher learning but also holds the promise of significantly improving educational outcomes. In some universities, select tutors have been designated as leaders in using digital technology

tools, a testament to the growing recognition of their potential (Lastariwati et al., 2021).

Among the reasons for incorporating digital technologies in teaching delivery is that they improve teaching and learning efficacy, which is defined by Samaei et al. (2018) as "the extent to which a teaching instrument adds to learners' retention of learning or skills, effectiveness as judged by tutors' grades, gained skills, information transfer, and concept retention." Additionally, various studies highlight ongoing recommendations from international communities advocating for developing transversal skills. These skills include problem-solving, critical thinking, creativity, collaboration, communication, innovation, entrepreneurship, and digital literacy (Tam & Trzmiel, 2018). This recommendation requires embedding these skills in Initial Teacher Education (ITE) programme (Adu-Gyamfi & Otami, 2020; Wafubwa et al., 2022). The implementation of the National Teachers' Standards and the Pre-tertiary Teacher Development and Management (PTPDM) policies in Ghana has further intensified the call for change in the teacher education programme in the country (Esther et al., 2025).

Many colleges view employing ICT as a teaching tool, and its success can be seen in all aspects of the Educational process, including improved infrastructure, curriculum and teaching-learning environments (Ibrahim et al., 2022). Additionally, it plays a significant role in raising the calibre of Education and making learning more meaningful and fruitful. However, integrating the ICT tools such as PowerPoint, telegram, WhatsApp and others in teaching involves preparing to deal with the challenges of incorporating them into teaching and learning. According to Ramírez-Montoya et al. (2017), the ability of teachers to effectively use ICT in the classroom, along with the teachers' digital competence, is central and crucial in developing

practical pedagogy, which enhances tutors' learning. The need for creative methods to infuse 21st-century abilities in courses is an inspiring and motivating aspect of using ICT in education.

Research by Instefjord and Munthe (2017) highlights that teachers' attitudes towards accepting ICT tools significantly influence their feelings about integrating these technologies into their instruction, particularly regarding their preparedness for such integration. Furthermore, Røkenes and Krumsvik (2016) discovered a significant correlation between teacher readiness and using digital devices in the classroom. According to Yilmaz Ince and Demirbilek (2013), integrating ICT is essential for enhancing tutors' 21st-century skills, including creativity, collaboration, communication, critical thinking, and problem-solving. In support of this, Lux et al. (2017) noted that implementing a new curriculum centred on real-world technological challenges provides scaffolding and resources that significantly enhance learning experiences, leading to transformative changes in colleges and classrooms. Additionally, Pultoo et al. (2020) emphasised that ICT acts as a catalyst, creating numerous opportunities for interaction and communication between teachers and tutors.

When ICT is used in the classroom, it helps teachers design classes that encourage simulation, manipulation, mind-mapping and guided exploration, and creative expressions that help tutors build knowledge and enhance their problem-solving skills (Eickelmann et al., 2017). Because of these benefits, teachers must be ready to accept this paradigm shift in learning and teaching (Avidov-Ungar et al., 2017). However, others have noted that they might not be ready yet, as they utilise ICT less frequently. Some reasons for this latter finding are unwillingness to change, ICT acceptability, lack of access, time, training, and technical assistance. More

specifically, research conducted by Alver and Roland (2010) revealed that teachers' enthusiasm for incorporating technology into the classroom has declined due to high workloads, time-consuming tasks, inadequate assistance, insufficient feedback, poor working conditions, and inadequate compensation. There is the indication that technical issues are significant obstacles to teachers' use of ICT, as well as low connectivity, virus attacks, and equipment failure, which may affect teacher acceptability and readiness.

1.2 Statement of the Problem

In 2003, Ghana initiated efforts to utilise digital technology to enhance access, equity, and the quality of education through its Information and Communication Technology (ICT) in Education Policy (Ohemeng & Ofosu-Adarkwa, 2014). The primary objective of this Policy was to incorporate technology into education to enhance teaching and learning, particularly in higher education, acknowledging the importance of technology in providing tutors with opportunities to improve their educational delivery. The policy was somewhat awkwardly timed, trying to serve as a foundation for advocating technology-driven education. The 2019 coronavirus pandemic (COVID-19) affected lifestyles and education delivery through ICT. During this pandemic, the Ghana government announced the suspension of all college operations at both pre-tertiary and tertiary levels to stop the spread of the virus (Tremblay et al., 2020). This suspension disrupted tutor learning and deprived them of opportunities for growth and development (UNESCO, 2020). At this time, digital learning emerged as a primary response to the disruption in education. However, the Ghana government considered but did not implement online tutor courses through its Ministry of Education. Thus, instead of being proactive in ensuring the rigorous implementation of online teaching and learning, the education system became

stagnant until after the crisis, when the government introduced an online platform to make core content accessible to all senior high college (SHS) level tutors. The Ministry plans to broadcast more content to junior high college (JHS) and upper primary tutors. However, the National Union of Ghana Tutors (NUGS) petitioned the government to halt all online academic activities at universities nationwide (Anyorigya, D. A., 2020). COVID-19: Halt Challenge-Rid... - Google Scholar, n.d. The NUGS referred to online learning as "challenge-ridden online learning." It cited inadequate incentives for colleges (lecturers and tutors), a lack of a properly laid framework for the implementation of online learning, and the plight of needy tutors who have been left out of the online learning platforms due to their inability to settle college bills. Another concern raised by NUGS is the possibility of compulsory exams and assignments on e-learning platforms that will disadvantage tutors unable to participate in online learning due to factors beyond their control.

NUGS' concern, while not far-fetched, is supported by the fact that in Sub-Saharan Africa, online learning is a challenge because of the unavailability of ICT facilities (Ajibade, 2018). Collaborating with this, reports a gap between the availability of ICT infrastructure and the capability of agrarian communities to integrate ICT to boost their economies. This same report notes that African universities and teacher education institutions do not have adequate abilities to integrate ICT in colleges. The governments and Education sectors of these countries, especially Ghana, must address the contextual and environmental challenges faced by impoverished and rural tutors who are unjustly excluded from e-learning platforms due to limited access to ICT resources and institutional difficulties in their implementation.

However, subsequent studies show that information is scarce regarding whether teachers in the country, particularly those teaching at the College of Education (Coe) level, view themselves as digital leaders whose primary responsibility is to promote the use of digital technology in teaching (Gyampoh et al., 2020; Nacca, 2018). Thus, providing technology infrastructure does not guarantee that teachers will accept and use technology. Other studies (Foy et al., 2019) have also shown that social influence plays a significant role in teaching. When teachers receive support from their peers, they are more likely to grasp how to use technology in their classrooms effectively. Furthermore, the college culture plays a significant role in how educators with limited technological proficiency adopt ICT in their teaching practices. Key factors such as administrative support, the availability of ICT infrastructure, teacher motivation, and access to professional development resources also influence this process. Additionally, individual characteristics, including years of teaching experience, age, gender, and other background factors, can impact a teacher's technology acceptance and utilisation (Ghavifekr, S. & Rosdy, W.A.W., 2015).

Although integrating ICT in education presents significant potential and advantages, progress towards enhancing the educational process and learning outcomes is hindered by insufficient teacher readiness, acceptance, and ICT implementation (Afutor, 2020). Numerous countries, especially in the developing world like Ghana, encounter similar challenges regarding ICT in Education, despite having intensified online teaching efforts during the COVID-19 pandemic (Aboagye, 2021). As a result, there appears to be a knowledge gap regarding the specific nature of digital technology tools, such as learning management systems, interactive whiteboards, and educational apps, employed in teaching delivery at the CoE level in Ghana, and whether or not these tools facilitate effective teaching and learning.

Despite the acknowledgment by the Colleges of Education (CoEs) regarding the integration of Information and Communication Technology (ICT) tools such as PowerPoint, telegram, WhatsApp and others in teaching practices, there exists a noticeable gap in the exploration of the impact that social influences, system characteristics, and individual differences have on educators' preparedness to adopt these ICT tools effectively. This underscores the necessity for a comprehensive investigation into this area. Specifically, as its objective, this thesis examines the acceptance and use of technology at CoEs and their relationships to system characteristics and individual teacher differences. The social influences of teachers on technology acceptance and use are studied to identify those that affect teacher acceptance and the use of ICT tools. Additionally, the study investigates the most dominant factors that affect teacher acceptance and use of technology.

1.2 Purpose of the study

This study explores the extent to which social influence, system characteristics, and individual differences affect the level of tool acceptance and use in teaching delivery at COEs.

1.3 Objectives of the study

The objective of the study was to investigate:

1) The level of acceptance and use of ICT tools in teaching at the COEs
2) The effect of social influence, system characteristics and individual differences on the extent of acceptance and use of ICT tools for teaching, in COEs
3) The dominant factors influencing the acceptance and use of ICT tools in Colleges of Education.

1.4 Research questions

To achieve the stated objectives of the study, the research questions are;

1) What is the extent of acceptance and use of ICT tools in teaching practices at the Colleges of Education?
2) To what extent do social influence, system characteristics and individual differences affect the acceptance and use of ICT tools in instruction at the Colleges of Education?
3) What are the dominant factors influencing the acceptance and use of ICT tools in instruction at the Colleges of Education?

1.5 Significance of the Study

The study's findings on how Social Influence affects the technological integration of ICT in instruction would be instrumental in directing policy in teacher professional development and teacher technology training.

In addition, the study will contribute to knowledge on how system characteristics and individual differences might influence the level of technology integration across the Colleges of Education in Ghana.

1.6 Limitation and Delimitation

The research employed a self-reported questionnaire, which poses limitations in capturing detailed insights regarding the variables of interest. To overcome the limitation of self-reported questionnaires, a pretest will be conducted at Abetifi Presbyterian College of Education. This ensures question clarity, enhances data reliability, and minimises response bias. The pretest will include pilot testing, triangulation with interviews and observations, and institutional support through tailored training to improve engagement and accuracy in ICT adoption research.

However, this study only investigated the extent to which lectures were using ICT in the teaching and learning process and also ascertain the ICT tools available at the colleges of Education in Ghana.

1.7 Operational Definition of Terms

Social influence:

Social influence refers to the impact that the presence or actions of others have on an individual's thoughts, feelings, and behaviours. It is a significant force that can shape various aspects of human behaviour, from consumer choices to political preferences. In the given context, the study investigates how social influence, system characteristics, and individual differences affect the acceptance and use of ICT tools in teaching practices at the Colleges of Education.

System characteristics:

In technology adoption, system characteristics refer to various attributes influencing users' perceived usefulness and ease of use. These characteristics include functionality, ease of use, reliability, security, compatibility with other systems, and perceived usefulness to the user. Designing and developing a system with these characteristics is crucial for ensuring user acceptance and effective technology adoption.

Individual differences in the Technology Acceptance Model: Individual differences reflect how ready and willing individuals are to adopt and effectively use technology. The Technology Acceptance Model (TAM) suggests successful adoption requires developing user-friendly, secure, reliable systems tailored to user needs and expectations. Training, support, and feedback can enhance user familiarity, confidence, and technology acceptance.

Technology Acceptance:

Technology Acceptance indicates that successful technology adoption relies on creating user-friendly, secure, reliable, and compatible systems while addressing the user's needs and expectations. Additionally, providing training, support, and feedback can assist users in becoming familiar with the technology and boost their confidence in utilising it.

Technology use:

Technology adoption encompasses how individuals or Organisations effectively use technology. Key factors influencing its effectiveness include usefulness, user-friendliness, compatibility, security, and seamless integration with other systems. Training, support, and feedback are vital to boosting users' confidence and performance and promoting technological innovation.

ICT Tools:

In the context of this thesis, ICT tools refers to the presentation tools and multimedia tools that aid teaching and learning in higher institutions such as colleges of education in Ghana.

Presentation tools:

Presentation tools are platforms designed for creating structured slideshows, utilizing text, imagery, and visual aids to convey information effectively, commonly used in educational or professional settings.

Multimedia tools:

Multimedia tools, on the other hand, encompass a wider spectrum of digital content, incorporating audio, video, and interactive elements to create a more immersive and dynamic user experience

1.8 Organisation of the Study

The research is structured into five chapters. The first chapter discusses the study's background, outlines the problem statement, presents the study's objectives, lists the guiding research questions, acknowledges limitations, and defines key terminologies.

The second chapter examines scholarly works relevant to the study topic. It includes a reflective review and assessment of theoretical and empirical studies from educational journals, publications, and various books that provide insights into the subject matter.

Chapter three covered the research methodology, detailing the research design, sample, sampling procedure, research instruments, data collection methods, and approaches to data analysis. Chapter four presented an in-depth data analysis, findings, and discussions from the study. The fifth and final chapter offered a summary conclusion, suggestions, and recommendations derived from the research.

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter evaluates both theoretical and empirical works of literature. This includes reports from Education journals, publications, and other books containing information about the study topic. For the study, this literature review was organised around the following: Theoretical Framework, the Technology Acceptance Model (TAM), Function of the Technology Acceptance Model, Individual differences' function in the Technology Acceptance Model, The advantages of implementing the Technology Acceptance Model, How the Technology Acceptance Model might help with ICT tools usage comprehension,

2.1 Theoretical Framework

This study used the Technology Acceptance Model (TAM) as a theoretical framework. Many fields, including corporate management, engineering, and computer science, have broadly adopted and implemented the TAM nodal (Al-Emran et al., 2018) due to its simplicity and ability to predict how users will react to new technologies accurately. TAM provides a broad framework for studying user behaviour during technology change initiatives.

2.1.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is foundational for understanding how and why people accept new technology (Davis, 1989).

TAM specifies the causal linkages between two key sets of constructs: (1) Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), and (2) User's Attitude (A), Behavioural Intentions (BI) and actual computer usage behaviour. The TAM

represents an important theoretical contribution toward understanding the readiness to use ICT and ICT acceptance behaviours in teachers and prospective teachers (Davis, 1989).

THEORETICAL FRAMEWORK

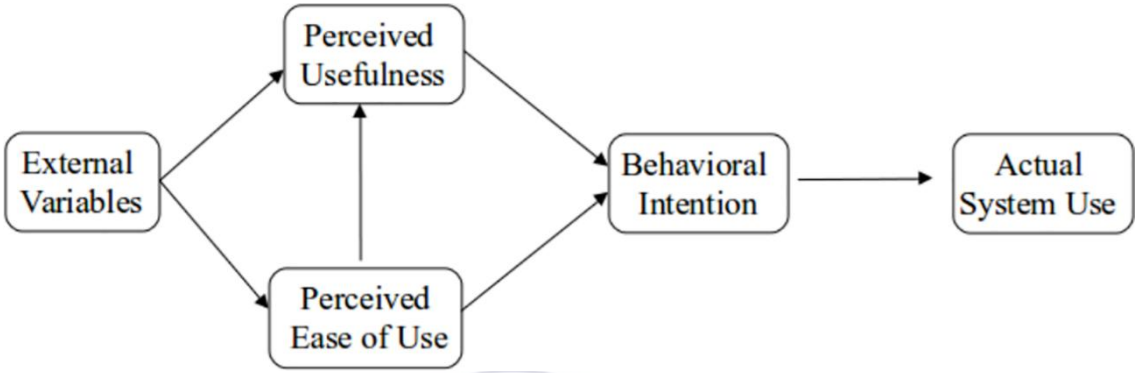

Figure 1: Technology Acceptance Model (Davis, 1989)

2.2 Function of the Technology Acceptance Model

The Technology Acceptance Model is used to assist Organisations in comprehending and managing the pace, acceptance, and utilisation of new technology (Sagnier et al., 2020). The approach is predicated on the fact that individuals' acceptance of new technology varies. Organisations can use TAM to determine how to market and embrace new technologies and to comprehend how different user groups are utilising new technologies. The five components of TAM are: perception, attitude, motivation, behaviour, and outcome. Each component is explained in greater depth below. TAM's initial element is perception, which refers to the initial response of individuals to new technologies. Individuals' views may be favourable or unfavourable, subject to change throughout time (Aydin, 2021). Organisations can utilise perceptions to determine how to promote and embrace new technologies based

on how consumers react. Perception management refers to how individuals alter their views about new technologies. Organisations can employ perception management to alter people's perceptions of new technology and promote its positive adoption.

Motivation identifies the factors that drive individuals to embrace new technologies. Organisations can leverage this to shift employee attitudes and behaviours towards these technologies, ensuring their beneficial utilisation. An employee's actions stem from motivation and perception, collectively called behaviour. Therefore, Organisations can shape employees' outlooks and actions regarding new technology to maximise its utility and achieve favourable results, such as increased sales, revenue, or better customer satisfaction (Ajibade, 2018). By assessing these outcomes, organisations can gauge the effectiveness of their technology adoption efforts and determine how to further encourage the integration of new technologies.

2.3 Individual Differences' Function in the Technology Acceptance Model

The Technology Acceptance Model is a model that helps organisations to understand how individuals engage with new technologies. It presupposes that individuals have varying degrees of acceptance of new technologies and is predicated on the notion that individuals vary in their willingness to adopt a new technology (Sagnier et al., 2020). This paradigm has been used to understand how individuals engage with modern technologies such as computers, cell phones, and medical gadgets. TAM consists of three components: the perceived technology environment, the perceived benefits of utilising the technology, and the actual technology used. The perceived technology environment comprises social norms, attitudes, and beliefs around the technology (Sagnier et al., 2020). The technology's perceived benefits include

usability, feature satisfaction, and perceived utility. Actual technology usage covers elements such as frequency of actual use, time spent utilising the technology, and the number of errors committed while using the technology. TAM has been used to understand how individuals interact with new technologies. For instance, it has been used to understand how individuals use computers, mobile phones, and medical gadgets and how they engage with new technologies in the workplace.

2.4 The Advantages of Implementing the Technology Acceptance Model

As technology continues to evolve, so does our capability to effectively utilise ICT tools (Dixit, Jain, & Patel, 2024). With enhanced image and audio quality enhancements, users now benefit from improved presentations and greater learning efficiency (Agyei & Voogt, 2011); the Technology Acceptance Model (TAM) is pivotal in this context. TAM was developed to aid individuals in understanding how their reactions to new technologies affect their overall acceptance of these tools. It begins by exploring individuals' motivations for adopting new technologies and evaluating their responses to various tools. By examining personal traits and their influence on technology acceptance, organisations can strategically implement new technologies to foster successful adoption and favourable reception (Buabeng-Andoh, 2019).

2.5 How the Technology Acceptance Model might help with ICT tools usage comprehension

A benefit of TAM is that it can assist consumers in understanding ICT tool usage. For example, it can help understand why people use ICT tools and how they operate. In addition, understanding how ICT tools operate allows users to be more prepared for their installation or use in any circumstance (Kissi et al., 2021). Moreover, TAM can

assist educational institutions in understanding and managing the speed, acceptance, and utilisation of new technology. Its practical use is adopting new ICT tools, which some employees may find challenging. In this case, TAM helps identify employees' many degrees of comfort and allows organisations to accommodate them better in the ICT implementation to promote its widespread adoption (Addae et al., 2022).

2.6 The Technology Acceptance Model and ICT tools usage in Education

Fred Davis introduced TAM in 1989 based on three fundamental assumptions: Individuals are varied; individual differences in perception are significant; and users and their surroundings are subject to mutual impacts (Shehzad et al., 2022). One of the most significant advantages of employing TAM is that it assists firms in predicting how individuals will utilise new technologies. Ajibade (2018) observed that TAM can help predict how quickly users will adopt new technology and what challenges they may face. Also, TAM is particularly useful in education since it allows educators to plan for using new technology in the classroom. It has been used to anticipate user acceptance of ICT tools; for instance, Bariham (2022) investigated the impact of ICT tools on classroom engagement and found that their use improved grades and resulted in more classroom interactions between teachers and tutors. According to the authors, this was because tutors had more opportunities to connect and learn from each other's presentations.

2.7 The Difficulties posed by the Technology Acceptance Model

The Technology Acceptance Model (TAM) posits that individuals can be categorised based on their level of technological proficiency, which significantly influences their willingness to adopt new technologies. Specifically, those with lower technical expertise may encounter difficulties accepting and utilising emerging technologies.

This challenge is particularly pronounced in professional settings, where integrating new tools can directly impact job performance, workflow efficiency, and career advancement. Consequently, understanding the nuances of technological proficiency is essential for organisations seeking to facilitate smoother technology transitions and improve overall acceptance among their workforce. This reluctance can be impacted by various variables, such as individual attitudes regarding the usefulness of technology, cultural norms that hinder technological development, and safety and security concerns. Despite these obstacles, technological innovations continue to increase in adoption. To encourage the adoption of new technologies, Educational institutions must consider both the unique preferences of their teachers and the technical limitations of the equipment they are acquiring. Therefore, Educational institutions must acquire ICT tools that appeal to both populations while minimising adoption hurdles. This can be challenging, but it is vital if Educational institutions wish to maximise the promise of new technologies (Sagnier et al., 2020).

2.8 ICT Tools and Technology Acceptance Model

The Technology Acceptance Model has been widely implemented in corporate settings to assist firms in determining how diverse employee groups accept new technology. However, the approach has not been well adapted to the widespread use of ICT tools in colleges and other Organisations (Al-Emran et al., 2018). This is partly attributable to the emphasis on individual decision-making in traditional college settings, while ICT tools are often communal. In addition, ICT tools are frequently perceived as novelty products, making it difficult for some users to take them seriously. In light of these obstacles, the following are three ways tutors might strengthen their efforts to use ICT tools: Educators could begin by adapting the

Technology Acceptance Model to ICT tools use. For instance, they could include a section on the communal applications of ICT tools, including group presentations and collaborative learning. Secondly, educators might prioritise user acceptability of ICT tools early in adoption. This could involve providing tutorials or other resources that explain how to properly use ICT tools and assist users in overcoming any initial hesitancy. Thirdly, tutors may attempt to foster a more communal environment for using ICT tools (Buabeng-Andoh, 2019). This could entail arranging classrooms for group work and encouraging tutors to share resources and ideas.

2.9 Future Prospects for the Technology Acceptance Model

The prospects for the Technology Acceptance Model will lie in continued research, exploring new contexts and enhancing its practical application in the future. The approach is founded on the following four principles: familiarity, competence, comfort, and acceptability. Familiarity refers to how well individuals understand new technology. Competence relates to how proficiently individuals utilise technology. Comfort relates to the ease with which individuals utilise technology. Acceptability is the extent to which people are willing to utilise the new technology. Measuring acceptability levels can be challenging when employing the Technology Acceptance Model, which is one of its limitations. In certain instances, acceptance levels can be measured by inquiring about individuals' attitudes toward the technology. Sometimes, acceptance levels can be determined by the frequency of technological usage.

2.11 Individual Responsibility Varies

As the number of our digital devices continues to grow, it is essential to master the Technology Acceptance Model (TAM). Gaining a deeper understanding of TAM can facilitate the adoption of new technologies and enhance their effectiveness

within our business, although no single model will fit all organisations. The successful implementation and adaptation of TAM require the commitment of both team leaders and members, just like any strategy. Recognising the motivations behind an individual's desire for new technology is critical for its successful adoption. Leaders should encourage team members to embrace new experiences and explore innovative solutions (Chen et al., 2020). Fostering an open workplace environment will help team members feel more comfortable experimenting with new technologies, increasing the likelihood of successful outcomes.

2.12 Managing Implementation Challenges

Organisations encounter various obstacles when adopting the Technology Acceptance Model. Because of its complexity, implementing this model demands considerable time and effort. Furthermore, it can be challenging to apply and understand. Assessment of the model has also been difficult. Additionally, modifications to the model can be cumbersome. To address these challenges, educational institutions should streamline their models. They should also improve usability and understanding. Ongoing monitoring of the implementation progress is essential, and adjustments to the model should be made as needed.

2.13 Individual Variations Matter

The Technology Acceptance Model is widely used to analyse and manage new technology adoption and deployment. Enterprises using TAM face several challenges. One is people's technological comfort. TAM can be made participatory to overcome this problem. This means that all employees assess their comfort with new technology. This lets everyone express their thoughts and feelings. People sometimes have different expectations about how new technology will affect their jobs, which

can be difficult. Some workers expect new technology to simplify their tasks, while others expect it to take longer. These differences must be considered while using the TAM. The TAM is important for businesses. Before it can be used effectively, several difficulties must be addressed.

2.14 Teacher ICT Integration Availability

As Qasem et al. (2016) stated, teachers must collaborate on projects and develop intervention strategies that include partnerships in ICT. There was a significant shift in teachers' perspectives on ICT integration, particularly among those in the blended learning training group. Technology must be incorporated into in-service teacher training programs so Yemeni Education officials can advocate for ICT-ready teachers. According to Alsaleh et al. (2019), while pre-service Saudi teachers were trained in specific teaching methods, they lacked classroom management, lesson planning, and technology integration skills, which aligns with global efforts to enhance teacher quality. Likewise, Summak et al. (2010) reported that tutors had limited technical skills, highlighting notable differences in ICT usage based on gender, age, and subject area. Cheal, Geer, and White (2012) suggest that these discrepancies may stem from teachers' experiences, indicating that contextualising ICT educational initiatives could promote their integration into the classroom. Anderson & Maninger (2007) also emphasise that such training programmes should feature well-constructed curricula to adequately prepare teachers for effective ICT integration.

In addition to this training, Yeni et al. (2016) conducted a comprehensive study on the frequency and extent of technology use by pre-service special education teachers in the classroom and their daily lives. Their findings, which indicated that

these teachers' attitudes toward ICT were shaped by their perceptions of its usefulness and the opinions of people they valued regarding technology usage, provide valuable insights for educators, researchers, and policymakers. Venkatesh et al. (2003) conducted a meta-analysis to create a framework for predicting and explaining user behaviour while tracking technological changes affecting technology usage over time. They identified four main moderators of technology adoption and use: performance expectancy, effort expectancy, social influence, and facilitating conditions. In their structural equation model, Graham et al. (2020) tested these four moderators and discovered statistically significant coefficients related to technology adoption and usage. Carlson & Gadio (2003) emphasised that teacher acceptance of technology is crucial for effective college technology utilisation, arguing that providing colleges with computers and software without considering teachers' technological proficiency is inefficient.

Alharbi and Drew also utilised the TAM model in 2014 to assess academics' intentions concerning LMS usage. Teachers viewed learning management systems positively and perceived technology use as reasonably accessible. Fathema et al. (2015) found similar results in their quantitative study, which extended the TAM model to faculty LMS usage in American higher education. Their structural equation modelling demonstrated that faculty attitudes toward technology positively impacted their beliefs about the ease of using said technology. Daher et al. (2018) reported that in-service Information and communication Technololgy teachers held positive views on ICT-enhanced instruction at the beginning and conclusion of their training. Moreover, their understanding and experience using ICT tools in Information and communication Technololgy education improved, leading to greater adoption decisions. Habiba & Ahmed (2020) identified barriers to ICT use in the classroom

among faculty, noting that neither gender, experience, nor teacher rank served as obstacles, as all teachers had access to software, hardware, internet, training, and institutional administrative and technical support.

The prevalent assumption is that teacher-trainers should adeptly employ ICT in the classroom. However, the widespread incorporation of ICT in various educational domains complicates the creation of a standardised platform for its implementation (Zainal & Zainuddin, 2020). For instance, ICT serves as a teaching support tool for mediating information (e.g., using videos, data ICT tools, mobile devices, and internet searches), curriculum development, and problem-solving. Another challenge is that it generates demands for management and implementation in the classroom.

Simple ICT knowledge is insufficient for classroom use, as different ICT competencies are required to suit teaching and constructive teaching methods. Constructive methods are more related to using ICT for curriculum comprehension or problem-solving, and teaching methods deal with how an instructor delivers a lecture. Contributing to this distinction, Agyei and Agyei (2021) correctly note that. The most important issue for educators is understanding the most efficient way of deploying technologies using various teaching methods.

ICT improves teaching for tutors and students, according to several studies. However, Wang, (2023) found that teachers are more "techno-optimistic" than tutors. Hanafi et al. (2017) found that the tutors surveyed were unmotivated to use ICT in teaching courses. These authors examined how the new smartphone app for augmented reality (MARLA) motivated university tutors to study using ICT. They surveyed 120 non-technical social science undergraduates, aged 19.5 on average. The

tutors were split into control and experimental groups, and the dependent variable was tutor motivation, whereas the independent variables were learning technique and gender. The experimental group used the MARLA app on their mobile devices to study, whereas the control group used similar software on their desktop PCS. An analysis of covariance showed that male tutors were more motivated to use mobile apps than female tutors, and no learning technique effect was found. The authors suggest that a mobile Educational tool may motivate non-technical College tutors, but its success would depend on its design and execution to accommodate gender differences.

Though ICT use in Education is well addressed in the Education literature, several meta-studies reveal new insights. A meta-study (Zhang et al., 2020) identified and synthesised 71 empirical studies on personalised learning from 2006 to 2019. It found that ICT in individualised teaching benefits tutors and students. Web-based adaptive learning systems, intelligent tutoring systems, Educational computer games, virtual reality systems, computerised adaptive assessments, mobile apps, and multimedia tools for digital storytelling were found relevant in the examined research. This suggests that customising learning using ICT is not a straightforward process that a short-term study or occasional use can handle. Personalising instruction with ICT is a prospective Education breakthrough requiring decades of stakeholder collaboration.

Talan (2020) also meta-analysed mobile learning's impacts on tutor performance using meta-primary investigation. A meta-analysis was performed on 104 publications from 2009 to 2019 that fulfilled the inclusion criteria. The survey sampled 7,568 people and found that mobile learning did not affect tutor learning performance based on Education level or implementation time. However, it affected

study performance (p 0.05). This exciting study shows that mobile learning may be used to customise course content and improve tutor learning. Increasing motivation and mobile platform accessibility may also improve performance.

Eksail & Afari (2020) found links between tutors' ICT opinions and classroom use. His study found that considering ICT's Educational value might improve attitudes towards technology. Stosic et al. (2020) conducted a fascinating study of ICT attitudes in Education to answer the question, "How does the attitude towards new media influence the appraisal of a new e-learning platform among existing and future teachers?" They found that a positive attitude towards media in one area, such as private, is directly proportional to a positive attitude in another. Snijders et al. (2018) predicted Educational ICT utilisation and expected educators' standing and function to change based on their results. The increased use of ICT is expected to make conventional college learning one of numerous possibilities.

2.16 Teaching Material Concept

To define teaching material, we will first define instruction and media (Belay et al., 2020). Note that teaching material is sometimes referred to as teaching media. Instruction involves the purposeful planning of classroom, laboratory, or workshop events aimed at helping tutors modify their behaviour or performance (Boakye & Nabie, 2022). Television, satellite communication, computers, and other cutting-edge technology are considered "media". Visual and audio-visual educational resources assist teachers and tutors in visualising complex concepts and ideas. The teacher supplements their teaching with these materials, which help tutors learn. Educational materials encompass books, audio-visual and other sensory materials, audio and television education scripts, and computer-managed building and manipulation items

(Abramovich et al., 2019). Teaching materials support instruction. Teaching resources foster tutor-tutor interaction and cooperative learning. These resources aid in tutor learning. Teaching media consist of all accessible human and material resources that engage tutors' senses of seeing, hearing, smelling, tasting, touching, and feeling, thereby facilitating teaching and learning. When children learn through multiple senses, they tend to learn faster and more effectively.

The Conceptual framework of the study is shown below:

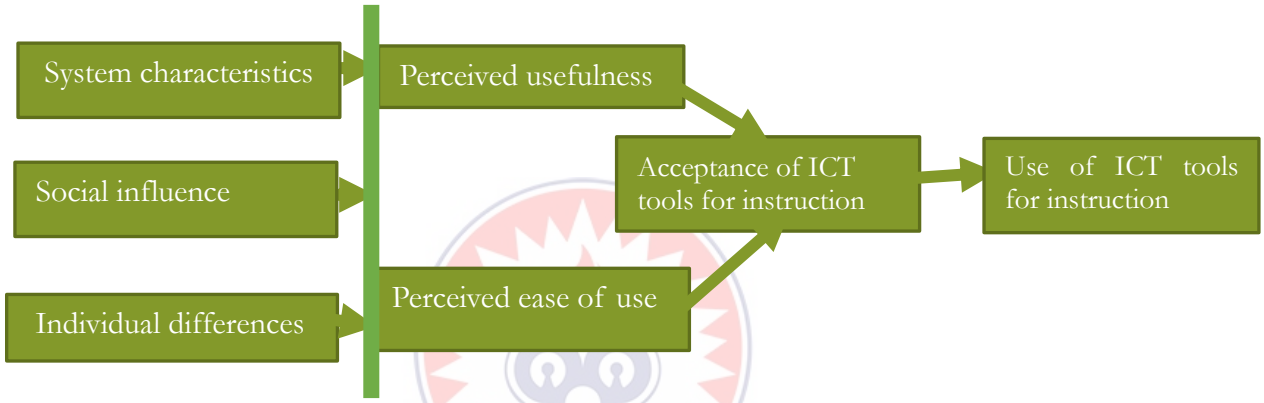

Figure 2: Conceptual framework

1. Institutional Characteristics and Technology Integration and Education

The Government of Ghana has invested many resources and initiated many policies to ensure that ICT is accessible to every Ghanaian tutor because of its pivotal role in Education. The first governmental policy on ICT was the ICT for Accelerated Development (ICT4AD) in 2003, which outlined a framework that sought to transform Ghana into an information- and knowledge-driven ICT-literate nation by the Ministry of Education (ICT4AD, 2003). This policy was reviewed twice (in 2006 and 2008) until a revised policy document was made available in 2009. The main goal of the revised version was to facilitate the integration, utilisation, and modernisation of ICT in colleges in Ghana and integrate it as a core subject, an elective subject, and

a teaching tool for all other subject areas. The policy highlighted that ICT access and literacy in Ghana were low. Hence, one of the goals of the 2007 Educational reforms was to ensure that all tutors in Ghana in pre-tertiary institutions acquired basic ICT literacy skills (including the use of the internet) and applied the learned skills in their studies and daily activities (Agyei & Agyei, 2021). A survey of 20 lecturers and 105 tutors at Accra Polytechnic revealed that access to ICT facilities was inadequate, the time to access ICT was inadequate, and there was little use of ICT software (Amanortsu et al., 2013). Another study in Ghana found that 60% of the respondents teaching ICT in the early years of college had knowledge about ICT, and 67% of the teachers did not integrate ICT into their teaching (Eksail & Afari, 2020). Boni (2018) concluded in his study that teachers and tutors in Ghana lacked efficacy and creativity in using ICT for teaching and learning. Studies have attributed the challenges associated with ICT integration in Ghanaian colleges to a lack of internet access, a lack of quality teachers, an insufficient number of computers, the high cost of ICT gadgets, and a lack of electric power in some communities. Another study in Ghana revealed that access to electricity is a significant factor affecting online learning in the country (Arthur-Nyarko & Kariuki, 2019). Despite the unprecedented efforts by successive governments to ensure ICT is integrated into teaching and learning, the process has been fraught with many challenges in Ghana, especially in the rural areas. This has resulted in Ghana's low ranking, 112th among 175 countries in the global ICT development index in 2016, after being ranked 123rd in 2014 (International Telecommunication Union, 2014; International Telecommunication Union, 2016).

2. Effectiveness of an e-learning programme

E-learning is beneficial 2019), but its effectiveness is contextual (Lembani et al., 2020). Tutors from developing countries score lower in online learning and are more

likely to withdraw from online courses compared to their colleagues in developed countries (Kizilcec & Halawa, 2015). A meta-analysis of existing U.S. data revealed that tutors engaged in online learning performed better than those in face-to-face sessions, while tutors who blended online and traditional learning performed the best of all (The Council of Independent Colleges, 2016). A tutor may be part of online learning but may not actively use the service or follow the tutorial.

3. Individual differences and technology integration

Teachers have long believed that there are individual variations in learning and instruction. Studies have shown that learners perceive information differently and achieve understanding at different rates and in other contexts (Adiredja, 2021; Hoang, 2021). Research also supports educators' assumption that tutors' learning and thinking styles impact academic success (Abah et al., 2022; Arthur-Nyarko & Kariuki, 2019; Boni, 2018). Furthermore, research results show that learners with matching learning styles retain information better, apply it effectively, and have positive attitudes towards the course subject compared to those with clashing learning styles (Abate et al., 2022; Awoniyi & Amponsah, 2023).

Not everyone appreciates matched learning and teaching methods; some may find them unappealing, making the effectiveness of teaching reliant on various factors. For example, Abonyi et al. (2020) and Eksail & Afari (2020) argue that the success of teaching techniques hinges on aspects such as the subject matter, tutor characteristics, and the time available, while teaching methods themselves seem not to influence tutor outcomes. These findings indicate that personal differences play a crucial role in teaching effectiveness, pointing out that instructional designers and educators face challenges in achieving the desired outcomes from tutors and must

consider individual learning preferences to some degree. This is crucial, as acknowledging individual learning styles can enhance learning effectiveness.

When designing instructions for a universal audience in a text-based environment, designers/teachers must create diverse, non-biased materials that cater to multiple learning styles, such as in online or Web-based courses. When creating adaptable learning resources, teachers/teaching designers should review studies on learning styles (Addae et al., 2022). Although research on learning styles and strategies informs teachers and teaching designers, there is limited research on the relationship between teaching design and learning styles.

4. Factors that affect ICT integration in Education

Integrating information and communications technology (ICT) in educational environments involves leveraging various technological tools to help tutors develop their knowledge. However, effectively using ICT in education goes beyond simply teaching tutors how to use computers. In many Ghanaian pre-tertiary colleges, the application of ICT remains limited mainly to computer literacy due to numerous challenges. As noted in 2020, these challenges include widespread computer illiteracy among teachers, a shortage of computers, and inadequate maintenance and technical support. Additional factors include resistance to change, lack of time, poor accessibility, low teacher confidence, inadequate understanding of ICT benefits, and limited resources (Alkahtani et al., 2020; Mafuraga & Moremi, 2017). Furthermore, Ibrahim et al. (2022) categorise these challenges into system-level, college-level, and teacher-level obstacles. System-level challenges relate to the overarching educational framework, while college-level obstacles are linked explicitly to the institution, including insufficient infrastructure and limited access to ICT resources.

It is of utmost importance in most developing countries in Africa and elsewhere to incorporate ICT into teaching and learning practices and plan to provide training for teachers to use ICT in their pedagogical activities. According to UNESCO (2017), Ethiopia's present strategy of providing high-quality Education is consistent with its teacher training Education. However, it lacks a policy for ICT implementation, thus creating a problem that must be addressed. Mwangi & Khatete (2017) report educators' desire to be trained in incorporating ICT into teaching and learning. According to them, teacher training institutions do not appropriately equip tutors with sufficient knowledge and abilities to integrate ICT into teaching and learning practices. In addition, they underlined the need for expertise in theory, technology, and pedagogy to incorporate ICT into teaching and learning successfully.

In order to address these challenges, Ghavifekr and Rosdy(2015) claim that the initial step in effectively utilising Information and Communication Technology (ICT) for educational purposes is to comprehend the operational mechanisms of the various tools within this domain. They advocate for the highest tiers of college administration to endorse the gradual integration of ICT. According to Adam et al. (2021), senior administrators who possess a favourable disposition towards using ICT in education can significantly enhance its integration and must engage actively in its execution. Conversely, individuals with negative perspectives regarding ICT may obstruct its incorporation into educational frameworks and should be excluded from the decision-making process. Therefore, achieving the objective of integrating ICT into teaching and learning necessitates more than merely concentrating on implementation and providing access to diverse ICT tools; it also requires initiatives aimed at training and fostering awareness. Notably, ICT implementation in African universities is deficient, characterised by insufficient technical support, funding, and requisite skills for

practical integration into education, which underscores critical areas for policymakers to address (Afutor, 2020; Ibrahim et al., 2022).

2.17 Summary

The Ghanaian government has invested heavily in ICT, with the first policy being the ICT for Accelerated Development (ICT4AD) in 2003—the revised policy aimed to integrate ICT into colleges and make it a core subject. However, challenges persist, particularly in rural areas. Access to ICT facilities, time to access ICT, and software usage are inadequate. Teachers and tutors in Ghana lack efficacy and creativity in using ICT for teaching and learning. Factors such as a lack of internet access, quality teachers, insufficient computers, high costs of ICT gadgets, and a lack of electricity are contributing to the challenges. Despite these challenges, Ghana ranked 112th in the global ICT development index 2016.

E-learning is beneficial, but its effectiveness is contextual. Tutors from developing countries score lower in online learning and are more likely to withdraw. A meta-analysis found that online learning performed better than face-to-face sessions, and blended online and traditional learning performed best.

Educators recognise the individual variations in learning and instruction, as tutors perceive information in diverse ways and achieve understanding at varying paces and contexts. Research indicates that learners with aligned learning styles tend to retain information more effectively, apply it proficiently, and exhibit favourable attitudes towards the subject matter. Nevertheless, teaching effectiveness is contingent upon several factors, including the topic being taught, the characteristics of the tutors, and the available time. To enhance learning outcomes, instructional designers and educators must take into account individual learning styles, develop diverse and

unbiased materials that accommodate a variety of learning preferences, and conduct reviews of existing studies on learning styles. However, research is scarce on the correlation between instructional design and learning styles.

The integration of information and communications technology (ICT) in education is crucial. However, many obstacles hinder its implementation, such as computer illiteracy, lack of maintenance, fear of change, insufficient time, inaccessibility, lack of instructor confidence, poor understanding of the benefits of ICT, and insufficient resources. These obstacles exist at the system, college, and institutional levels. Incorporating ICT into teaching and learning practices in developing countries like Ethiopia is essential. However, teacher training institutions often lack adequate knowledge and expertise in theory, technology, and pedagogy. To overcome these issues, it is vital to understand the functions of ICT tools and involve senior managers with positive attitudes towards using ICT in education. Initiatives aimed at training and raising awareness are also needed. In African universities, ICT implementation is poor, lacking technical support, funding, and skills, indicating areas for attention by decision-makers.

CHAPTER THREE

METHODOLOGY

3.0 Overview

This chapter describes the study's methodology. It covers the research paradigm, approach, design, study population, sampling, research instruments, data collection and analysis, reliability and validity of questions, and ethics.

3.1 Research Paradigm

The research paradigm comprises ontological, epistemological, and methodological assumptions and beliefs (Goundar, 2012). Such paradigms show how researchers view their field. Positivism and interpretivism are two major philosophical paradigms (Kusuma et al., 2021). Many philosophical paradigms have evolved due to advances in human thinking and ways of explaining world phenomena. Philosophical approaches help researchers decide which method to use and why (Kusuma et al., 2021). The researcher's research philosophy determines the methodologies and strategies used in a study; therefore, the researcher uses positivism. The positivist philosophical method is based on data collection and hypothesis development. Positivist researchers work with quantifiable observations and use statistical analysis (Apuke, 2017). These limits prevent data manipulation, ensuring accurate results.

3.2 Research Approach

Research strategy, informed by a research philosophy, includes plans and methods (Cohen et al., 2017). The methods involve assumptions and data collection, analysis, and reporting procedures. The study's approach includes all decisions, procedures, designs, and techniques. Qualitative, quantitative, and mixed-method research designs are built on philosophical assumptions (Cohen et al., 2017).

This study is a quantitative research approach. Quantitative research examines the link between variables to test or measure reality (Apuke, 2017). It analyses research data using descriptive and inferential statistics. Mostly mean, standard deviation, regression, and correlation analysis (Bloomfield & Fisher, 2019). Quantitative researchers are positivists who do everything scientifically. By testing hypotheses deductively, bias is avoided, and procedures are taken to control factors so that findings can be generalised and replicated. Quantitative research gives measurable data and can take huge samples because researchers can objectively measure and compare (Bloomfield & Fisher, 2019). It is on this idea that the research was conducted.

3.4 Research Design

The literature identifies two types of research design: experimental and non-experimental. Experimental studies randomise control and experimental groups (Kothari, 2017) with interventions for the participants, whereas non-experimental studies are primarily observational. Regardless of the type of research design chosen, Koerber and McMichael (2008) and McMillan (2014) describe it as the plan for selecting subjects, research sites and data collection procedures to answer the research questions. Similarly, Creswell and Clark (2017) describe it as the blueprint (plan) or an outline for conducting a study to exercise maximum control over factors that could interfere with the validity of its results. Additionally, James' research design shows which individuals will be studied and when, where and under which circumstances they will be studied to get credible results. Adding to these, Burns and Groove (2014) assert that research design helps researchers plan and implement studies in ways that help them obtain the needed results that could be compared with real situations.

Recognising these distinctions and the importance of research design, this study is non-experimental and quantitative. The study is a survey by design which used a series of questions to elicit responses from a sample of respondents (Check & Schutt, 2012) and provides data that is quantifiable by assigning numbers to answers so that statements about issues can be measured objectively, compared and subjected to statistical analyses to draw meaningful research conclusions. Also, the choice of the survey approach hinges on the fact that it has been demonstrated to be efficacious and trustworthy and not only used in academia, but also in the business community, and by political parties, the media, and governments to obtain accurate and quality data (Cohen et al., 2017). Its use provides an opportunity to collect quantitative data from a pool of respondents by asking survey participants multiple survey questions and to be able to generalise the results.

3.5 Survey Research Design

A survey research design is inherently non-experimental and quantitative. This design utilises an instrument administered to participants to collect data to resolve research questions (Kothari, 2017). In adherence to established practices, it formulates a series of statements intended to elicit responses from a selected sample of respondents (Abdulghani et al., 2014). While survey methods may be categorised as time series, cross-sectional, or a combination of both, or may rely on a panel approach (Kumar, 2018), this study employs explicitly the cross-sectional method as delineated in Allen (2017), by gathering data at a defined point in time (Apuke, 2017). This methodology aligns with practices in various fields, including retail, education, healthcare, and small to medium-sized enterprises. Moreover, although alternative methods for obtaining responses exist, such as telephone interviews, mailed questionnaires, and online surveys, face-to-face administration of questionnaires is

frequently preferred due to its high response rate, convenience, and swift execution (Kothari, 2017a). However, it is pertinent to note that this method entails considerable expense, as it necessitates hiring personnel for administration.

3.5 Methods of Conducting Survey Research

3.5.1 Time series (longitudinal) survey research: If the survey method is longitudinal, it involves collecting qualitative or quantitative data over time. By this approach, respondent behaviour, preferences, and attitudes are observed over a specific period to analyse the reasons for a change in behaviour or preferences. For example, suppose researchers want to learn about the eating habits of teenagers. They can follow a representative sample over time and collect information about what they eat.

3.5.2 *Cross-sectional survey research:* In contrast, in cross-sectional surveys, researchers collect data about several individuals (e.g., the teenagers in the above example) or firms in an industry at a point in time (e.g., a year) to gain insights into their behaviour or performance at that point. This survey is used in various sectors of the economy, such as retail, Education, healthcare, SME Educational institutions and others and can be either descriptive or analytical. Its advantage is that it is quick and reliable and helps researchers collect data briefly when the trend is not of the essence (Alansari et al., 2022).

3.5.3. Panel survey research: In the above example of teenagers, the information is cross-sectional (when one year's data are considered), time series when all years are considered for an individual and pooled time series and cross-sectional when all teenagers are considered for all years. The data in this example can be stratified by

identifying teenagers and determining the year in which to create panel data. This allows for the analysis of within and between-group variation and time effect.

Despite the advantages of these data types, this thesis employs a cross-sectional survey as it is the most suitable option given the setting and participants involved.

3.6 Survey Method

While there are various methods for researchers to gather data from respondents, the face-to-face approach was chosen due to its high response rate (Kumar, 2018). This method also allows for quicker administration of multiple questionnaires, particularly with structured forms. Additionally, it is convenient, thorough, and trustworthy. In this study, the questionnaires were completed within thirty minutes at the chosen college. The college coordinated the participants in the assembly hall, where they answered the questions independently in a relaxed setting.

3.7 Targeted Population

The emphasis is on tutors from all 46 Public Colleges of Education (CoE) across Ghana.

3.8 Method for Data Collection

A simple random sample of willing participants was drawn and the questionnaire was administered to them by colleague representatives in COEs and the completed questionnaire was returned to the researcher electronically. Before this full administration of the questionnaire, a pilot study was done at Abetifi Presbyterian College of Education to test the survey instrument for ease of understanding. This resulted in some changes to the questionnaire, particularly the wording of some item statements.

3.8 Sampling Procedure and Sample Size

Sampling is a technique used to infer characteristics of a population from a limited set of observations. It minimises costs, saves time, and enhances outcomes (Etikan & Bala, 2017). A total of 109 tutors from the Colleges of Education in Ghana participated in the study. These tutors were randomly selected, with a random sample comprising 25 tutors out of 45 available. Each of the 45 tutors was assigned a number from 1 to 45, which was written on small pieces of paper. All 45 papers were placed in a box, shaken vigorously to ensure randomness, and then 25 papers were drawn, with the corresponding numbers noted. The tutors linked to these numbers formed the simple random sample. Questionnaires were distributed to select tutors for assistance in administration, and an online link to the questionnaire was also shared on the Colleges of Education Association of Ghana (CETAG) platforms, designed for tutors across 46 Colleges of Education in Ghana. Both hard and electronic copies of the data were collected and coded using SPSS for analysis.

3.9 Data Collection Instrument

The study used the Technology Test Instrument (TTI) from the International Test Commission (ITC) (2017), adapted from Lewis, James (2002). A five-point Likert Scale questionnaire was developed to gather responses from participants recruited for the study (refer to Appendix A). The questionnaire was structured into four sections aligned with the study's objectives. The first section targeted respondents' demographic information, while the remaining three sections included questions personalised to address each of the three research questions.

3.10 Scoring of the Instrument

Survey participants indicated their agreement level with various statements about the Technology Test Instrument (TTI) using a five-point Likert scale: 5 - Strongly Agree (SA), 4 -Agree (A), 3 - Neutral (N), 4 - Disagree (D), and 5 - Strongly Disagree (SD). The statements were framed positively and negatively to minimise bias in participants' satisfaction levels regarding their responses. A positively worded statement example is, “Tutors are more enthusiastic about the subjects for which computers are utilised.” Conversely, a negatively worded example is, “Computers hinder tutors’ effectiveness with learning tasks.” The negatively framed items were recoded for data analysis. Both statement types were assessed using the same Likert scale, chosen for its appeal to respondents, as many find it enjoyable to complete (Zaker & Nosratinia, 2021). The Likert scale is advantageous because it is easy to construct and interpret, enabling the calculation of frequencies, percentages, and other descriptive statistics. This approach also supports advanced statistical analyses, including analysis of variance (ANOVA), T-tests, and regression (Fraenkel & Wallem, 2000; Muijs, 2004). Additionally, research indicates that Likert scales provide data with relatively high reliability.

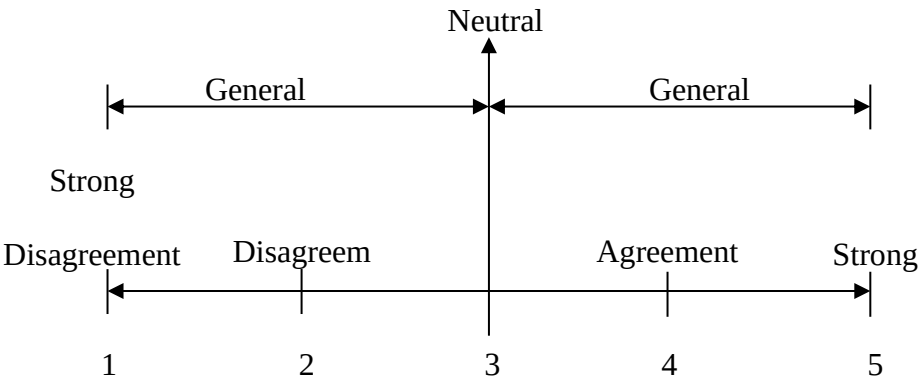

Figure 3.1: The neutral position on the five-point Likert-type scale

3.12 Validity and Reliability of the Instruments

Thus, validity pertains both to the characteristics of the instrument itself and its intended applications. Once the questions were acquired, measures were implemented to conduct a pre-test of the instruments using additional tutors. This facilitated the reframing of the itemised statements when necessary and the removal of items deemed applicable for deletion. Subsequently, the Department Head of ICT at the researcher's institution and two senior ICT tutors were consulted to review the questionnaire before submitting it to the researcher's supervisor for final evaluation and approval.

3.13 Reliability

This study evaluated internal consistency as reliability, using Cronbach's alpha, akin to the correlation coefficient. A value of 0.75 is viewed as acceptable (Kothari, 2012). A high coefficient, such as r = 0.98, suggests that both instruments are largely free from measurement errors. A coefficient above 0.7 is considered satisfactory, while a value exceeding 0.8 is regarded as very good (Kothari, 2017b; Zohrabi, 2013). With a Cronbach's alpha of 0.7, the questionnaire lies within the acceptable range, indicating it is reliable.

3.14 Data Processing and Analysis

The responses from the questionnaire items were coded and analysed using the Statistical Package for Social Science (SPSS Version 27). This software was chosen because it is reasonably user-friendly and performs most of the necessary data analysis for quantitative research. It is the most common statistical data analysis tool used in educational research (Muijs, 2004). The researcher completed the data entries

and verified them for accuracy. Additionally, the data were exported to Microsoft Excel to create bar graphs and pie charts.

3.15 Ethical Principles

The researcher obtained approval from the college principals prior to distributing the questionnaire. Moreover, participants were guaranteed confidentiality, which meant no names were necessary on the questionnaire or during its completion. Every participant signed the consent form (Appendix B).

3.16 Ethical considerations

The following ethical considerations were taken care of;

3.16.1 Confidentiality

Confidentiality entails carefully handling participant information. Respondents were informed that the information collected would be used exclusively for academic purposes and kept confidential (Ngozwana, 2018). They were assured that their data would not be exploited for personal gain and that the results would remain strictly academic. According to Oliver (2010), ethics and morals outline acceptable and unacceptable behaviour standards. Before data collection, the researcher secured consent forms from participants, and to ensure anonymity, the questionnaire did not include any identifying information regarding the participants.

3.16.2 Voluntary Participation

Participants were informed that their participation in the study was voluntary and optional, and they could withdraw at any time.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Overview

This chapter provides an overview of the study's results and is organised starting with the demographic characteristics of the respondents, the results, and finally, the discussions.

4.1 Demographic Characteristics of Respondents

Of the 109 prospective tutors surveyed, 70.6% (N = 77) were male and 29.4% (N = 32) were female, highlighting a male majority. Participants aged 41 and older represented 36.7% (N = 40), while those between 36 and 40 years accounted for 35.8% (N = 39). The smallest age group, aged 30 to 35, comprised 27.5% (N = 30). As a result, most respondents were over 35 years old. Regarding education, 93.6% (N = 102) held master's degrees, while 6.4% (N = 7) obtained PhDs. More than half of the participants (53.2%, N = 58) had 10 to 20 years of teaching experience; 24.8% (N = 27) possessed 21 to 30 years; 19.3% (N = 21) had fewer than 10 years; and a small fraction (2.8%, N = 3) had over 30 years of teaching experience. The subjects taught by participants varied: Languages (8.3%, N = 9), Mathematics/Information and Communications Technology (52.3%, N = 57), Science (13.8%, N = 15), Social Sciences (11.9%, N = 13), Vocational (2.8%, N = 13), and Education (11.0%, N = 12), as shown in Table 4.1.

4.2 The Level of Acceptance and Use of ICT Tools in Teaching Practices

This section reports on the acceptance and utilisation of ICT tools in the teaching practices of College Tutors. Descriptive Statistics refers to the techniques for summarising and organising data meaningfully. This approach aids researchers and analysts in grasping the fundamental characteristics of a dataset without making predictions or drawing conclusions that extend beyond the data itself. Table 4.2 presents the findings using a five-item Likert scale (1-Strongly Disagree, 2-Disagree, 3-Undecided, 4-Agree, 5-Strongly Agree), where 3.0 serves as the midpoint. In this continuous scale, a mean score below 3.0 indicates disagreement, while a mean score of 3.0 or higher indicates agreement.

4.2.1 Level of Use

Table 4.1: Acceptance and Use of ICT Tools in Teaching Practices

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

The study ascertained that participants agreed that using ICT tools in teaching practices helps improve tutors' learning outcomes ($= M = 4.56, = SD = 0.60$). Respondents further accepted that using ICT tools in teaching practices saves time and effort (M=4.53, SD=0.70). The majority of the participants agreed that "Using ICT tools in teaching practices makes teaching more interesting" (M=4.52, SD=0.66),

as well as that "using ICT tools in teaching practices is easy for me"($M = 4.31, SD = 0.80$).

Most respondents indicated their intention to utilise ICT tools in future teaching practices (M=4.53, SD=0.63). Additionally, participants expressed strong agreement that incorporating ICT tools into their teaching is straightforward (M=4.26, SD=0.81). They also agreed that learning to use these tools in teaching is easy (M=4.25, SD=0.70), they can troubleshoot ICT issues that arise during lessons with relative ease (M=3.72, SD=0.99), and they would advocate for other teachers to adopt ICT tools in their teaching practices (M= M=3.23, SD=1.66).

4.2.2 Level of Acceptance of ICT Tools

I intend to use ICT tools in teaching practices in the future	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 teaching practices	109	4.25	.696
I find it easy to troubleshoot ICT problems that occur during teaching practices	109	3.72	.992
I would recommend using ICT tools in teaching practices to other teachers	109	3.23	1.653

Source: Field Data, 2023

To achieve objective one of this study, investigating the level of acceptance and use of ICT tools in teaching practices, responses on acceptance and use were classified into levels as shown in Table 4.2.1 and Figure 4.1. Using a criterion mean of 3.0 for decision-making, levels 3.0 and above were considered high, whereas below 3.0 were considered low. From Table 4.2.1, the level of acceptance of ICT tools in teaching practices was rated high($M = 4.49, SD = 0.51$). With a $ean\ of$ 3.99 ($SD = 0.51$), the level of use of ICT tools in teaching practices by College Tutors is high.

Table 4.2.1: Level of Acceptance and Use of ICT Tools in Teaching Practices

Levels	N	Minimum	Maximum	Mean	Std. Deviation
Acceptance	109	1.60	5.00	4.49	.50815
Use	109	2.80	5.00	3.99	.51423

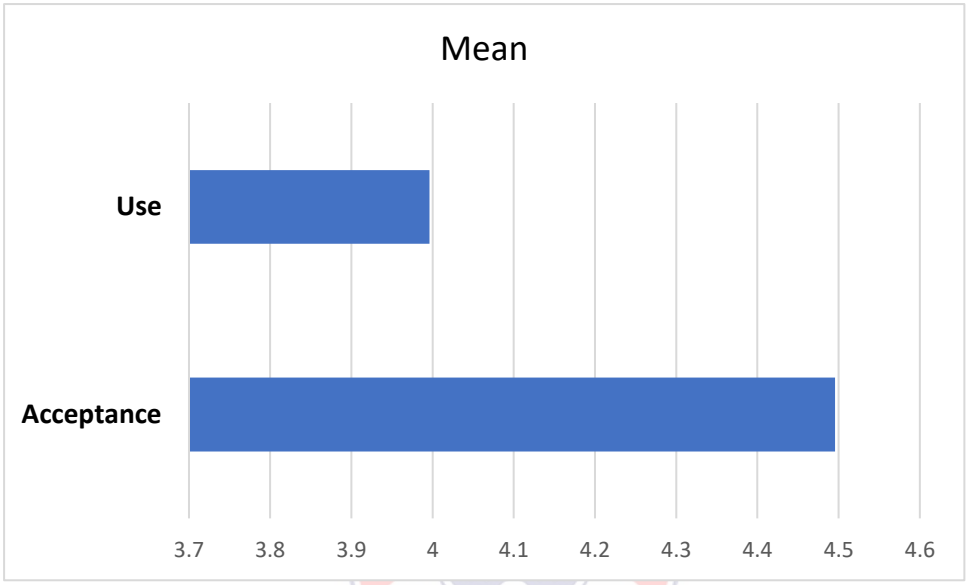

Figure 4.1 Levels of use and acceptance of ICT tools.

4.3 The Effect of Social Influence, System Characteristics and Individual Differences on the Extent of Acceptance and Use of ICT Tools for Instruction

To answer research question two on "what extent do social influence, system characteristics and individual differences affect the acceptance and use of ICT tools in instruction at the Colleges of Education?" a series of items bordering on Social Influence, System Characteristics and Individual Differences were issued to score less than 3.0 indicates a disagreement. In contrast, a mean score greater than/equal to 3.0 indicates an agreement.

Table 4.2: Social Influence, System Characteristics and Individual Differences on the Extent of Acceptance and Use of ICT Tools for Instruction

Variables	N	Mean	Std. Dev
Social Influence	109	4.01	.928
My colleagues' use of ICT tools in teaching practices, which encouraged me to use them, was a significant factor in our study, with a mean score of 4.01 and a standard deviation of .928. This positive social influence is a promising sign of acceptance of the ICT tool in education.			
The use of ICT tools in teaching practices is valued by the parents and tutors	109	3.94	.785
The use of ICT tools improves the class climate, which motivates me to use ICT tools in teaching practices	109	4.30	.674
The college highly commends colleagues who use ICT tools in teaching practices	109	4.05	.896
The use of ICT tools in teaching practices saves time and energy.	109	4.50	.661
System Characteristics			
My college encourages the use of ICT tools in teaching practices	109	4.31	.716
The government supports the use of ICT tools in teaching practices	109	3.62	1.185
The ICT tools available at my college are of good quality	109	3.65	1.133
The ICT tools available at my college are reliable	109	3.47	1.229
The ICT tools available at my college are easy to use	109	3.80	.989
Individual Differences			
I feel comfortable using ICT tools in teaching practices	109	4.39	.679
I am confident in my ability to troubleshoot ICT problems that occur during teaching practices	109	3.78	.906
I often use ICT tools outside of teaching practices	109	4.25	.655
I am interested in learning about new ICT tools for teaching practices	109	4.52	.618
The ICT tools available at my college are similar to those I use outside of teaching practices	109	3.84	.973

Table 4.3 shows that most participants strongly agreed that their colleagues use ICT tools in teaching practices, encouraging them to use them as well($M = 4.01, SD = 0.93$). Respondents agreed that the use of ICT tools in teaching practices is valued by the parents and tutors($M = 3.94, SD = 0.79$), the use of ICT tools improves the class climate which motivates me to use ICT tools in teaching practices ($M = 4.30, SD = 0.67$) and Colleagues who use ICT tools in teaching practices are highly commended by the college ($M = 4.05, SD = 0.90$). Moreover, participants strongly agreed that the use of ICT tools in teaching practices saves time and energy($M = 4.50, SD = 0.66$), their college encourages the use of ICT tools in teaching practices ($M = 4.31, SD = 0.72$) and the use of ICT tools in teaching practices is supported by the government ($M = 3.62, SD = 1.19$). It was also ascertained that the ICT tools available at the various colleges were of good quality($M = 3.65, SD = 1.13$), the ICT tools were reliable ($M = 3.47, SD = 1.23$), and easy to use ($M = 3.80, SD = 1.00$).

Most respondents indicated they feel at ease using ICT tools in their teaching (M=4.39, SD=0.68). They also express confidence in troubleshooting ICT issues that arise during their teaching (M=3.78, SD=0.91), frequently use ICT tools outside of teaching (M=4.25, SD=0.66), and show a keen interest in learning about new ICT tools for teaching (M=4.52, SD=0.62). Additionally, they noted that the ICT tools offered at their college are similar to those they utilise outside of teaching (M=3.84,=0.97).

The data collected from the five-point Likert scale items on the variables: Social Influence, System Characteristics and Individual Differences were aggregated and computed to find their overall means and standard deviation as shown in Table 4.3.1.

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 4.3.1: Descriptive Statistics

Variables	N	Mean	Std. Deviation
Social influence	109	4.16	.50704
System Characteristics	109	3.77	.82544
Individual Differences	109	4.05	.4567

Multiple Linear Regression Analysis was used to achieve objective two: investigate the effect of social influence, system characteristics, and individual differences on the acceptance and use of ICT tools for instruction (Table 4.3.2). The predicted variable was "Acceptance"; the other variables were Social Influence, System Characteristics, and Individual Differences. From the ANOVA table (Table 4.3.3) for the regression statistics, the "Regression" row shows that the regression model explains 9.127 units of the total variation. The "Residual" row shows 18.761 units of unexplained variation. In the "Total" row, the total variation in the dependent variable is 27.888 units. There are 3 degrees of freedom associated with the model in the "Regression" row. In contrast, in the "Residual" row, 105 degrees of freedom are associated with the error, and in the "Total" row, there are 108 total degrees of freedom.

Table 4.3.2: 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

Table 4.3.3: 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 F-statistic, $F = 16.906$, suggests that at least one of the predictors in the model has a significant effect on the dependent variable. The p-value of 0.000 indicates that the regression model is statistically significant, meaning that 'Social Influence,' 'System Characteristics,' and 'Individual Differences' as predictors explain the variation in the 'Acceptance' dependent variable.

Table 4.3.4: Multiple Linear Regression Analysis of Acceptance of ICT Tools for Teaching

Coefficients[a]						
Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.638	.416		3.938	.000
	Social Influence	.563	.102	.561	5.539	.000
	System Characteristics	-.157	.069	-.256	-2.284	.024
	Individual Characteristics	.268	.095	.272	2.802	.006

a. Dependent Variable: Acceptance of ICT Tools for Teaching

The findings reveal that Social Influence positively impacts Acceptance of ICT Tools for Teaching (B=0.561, p < 0.001), while System Characteristics negatively influence Acceptance (B=−0.0256, p = 0.024). Individual Characteristics also positively affect Acceptance (B=0.272, p = 0.006). In conclusion, the data indicate that social influence, system characteristics, and individual characteristics significantly predict the acceptance of ICT tools for teaching, with social influence exerting the most significant impact.

Table 4.3.4 shows an ANOVA of the Use of ICT Tools for Teaching. The "Regression" Mean Square is 2.268, and the "Residual" Mean Square is .207. The F-statistic is F = 10.948. A high F-value suggests that the regression model is highly significant in explaining the variation in the dependent variable, "Use." Moreover, the p-value is close to zero (p = 0.000), indicating that the regression model is statistically significant.

Table 4.3.4: ANOVA of Use of ICT Tools for Teaching

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

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 findings indicate that "Social Influence," "System Characteristics," and "Individual Differences" play a crucial role in explaining the variations in the "Use" of ICT tools for Instruction. The high F-statistic and a p-value near zero reveal a robust relationship between the predictors and the dependent variable.

Table 4.3.5 Multiple Linear Regression Analysis of Use of ICT Tools for Teaching

Coefficients[a]						
Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.565	.447		3.499	.001
	Social Influence	.325	.109	.321	2.978	.004
	System Characteristics	-.001	.074	-.002	-.016	.988
	Individual Characteristics	.260	.103	.262	2.536	.013

a. Dependent Variable: Use of ICT Tools for Teaching

Table 4.3.5 presents the results of a multiple linear regression analysis, with the dependent variable being "Use of ICT Tools for Teaching." The table also shows the coefficients of the independent variables that predict the use of ICT tools for teaching. The findings reveal that Social Influence significantly enhances the Use of ICT Tools for Teaching (B=0.321, p = 0.004). Conversely, System Characteristics do not significantly impact the Use of ICT Tools for Teaching (B=-0.002, p = 0.988), whereas Individual Characteristics positively influence the Use of ICT Tools for Teaching (B=0.262, p = 0.013). Therefore, this table indicates that social influence and individual characteristics are key predictors of using ICT tools in teaching, while system characteristics show no substantial effect.

4.4 Dominant Factors that Influence the Acceptance and Use of ICT Tools

The third objective of the study is to investigate the most dominant factors that influence the acceptance and use of ICT tools.

4.4.1 Factors that Influence Acceptance of ICT Tools

Principal component factor analysis determined the key factors influencing teachers' acceptance of ICT tools in Colleges of Education. The Bartlett's test of sphericity yielded significant results ($X2$=48.294, df=10, p=0.00), indicating that the correlation among these factors is significantly higher than zero.

Table 4.4.1: Bartlett's Test of Sphericity

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.581
Bartlett's Test of Sphericity	Approx. Chi-Square	48.294
	Df	10
	Sig.	.000

According to the variance data presented in Table 4.4.2, Factor 1 (Using ICT tools in teaching practices helps me to improve tutors' learning outcomes) and Factor 2 (Using ICT tools in teaching practices saves time and effort) have a significant impact on teachers' acceptance of ICT tools for educational purposes. Factor 1 accounts for the most significant variance among all components, with an eigenvalue of 1.762. This factor represents 35.232% of the total variance, which captures a significant amount of the data's variability. The Extraction Sums of Squared Loadings value of 1.762 reveals a strong correlation between the included variables and this component.

Factor 2 accounts for the second-largest variance, with an eigenvalue of 1.071, representing 21.426% of the total variance. This factor plays a crucial role in understanding the data. With a cumulative percentage of 56.658%, Component 1 explains more than half of the total variance (refer to the Scree Plot in Figure 1).

Component 3 (Using ICT tools in teaching practices makes teaching more interesting) continued to contribute to the overall explanation of the data's variability.

An eigenvalue of 0.940 explains 18.800% of the total variance. The cumulative percentage of 75.458% demonstrates that Components 1, 2, and 3 together explain over three-quarters of the total variance.

Table 4.4.2: Principal Component Analysis of Factors that Influence Acceptance of ICT Tools

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.762	35.232	35.232	1.762	35.232	35.232
2	1.071	21.426	56.658	1.071	21.426	56.658
3	.940	18.800	75.458			
4	.754	15.085	90.542			
5	.473	9.458	100.000			

Extraction Method: Principal Component Analysis.

These factors, “Using ICT tools in teaching practices helps me to improve tutors' learning outcomes”, “Using ICT tools in teaching practices saves time and effort”, and “Using ICT tools in teaching practices makes teaching more interesting”, were the dominant factors that influenced College Tutors’ acceptance of ICT tools. Components 4 (Using ICT tools in teaching practices makes teaching more interesting) and 5 (Using ICT tools in teaching practices is easy for me) were not dominant factors contributing to tutors’ acceptance of ICT tools.

Principal Component Analysis of Factors that Influence Acceptance of ICT Tools

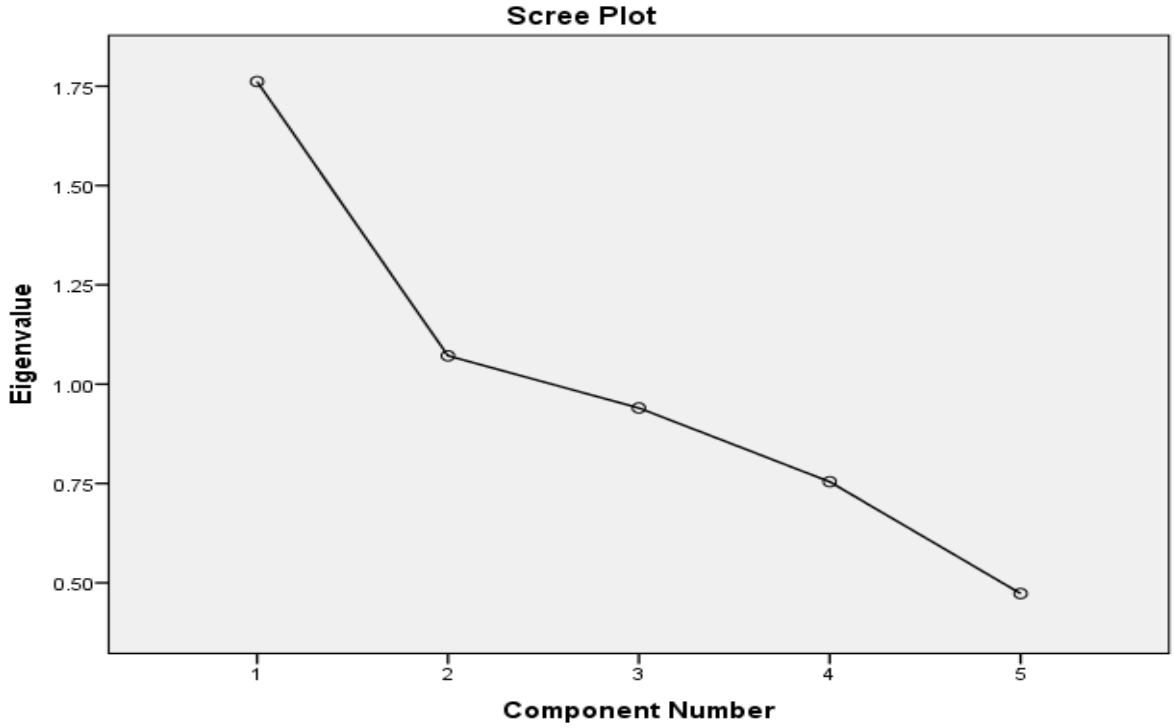

Figure 4.1: Scree Plot of Principal Component Analysis of Factors that Influence Acceptance of ICT Tools

4.4.2 Factors that Influence Use of ICT Tools

Principal component factor analysis was used to determine the most significant factors that influence teachers' Use of ICT tools for teaching and learning in Colleges of Education. Bartlett's sphericity test was significant ($X2$=151.2, df= 10, p= 0.00). This shows that the factors' correlations are significantly greater than zero, as shown by Table 4.3.3.

Table 4.4.3: Bartlett's Test of Sphericity of Factors that Influence Use of ICT Tools

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.791
Bartlett's Test of Sphericity	Approx. Chi-Square	151.197
	Df	10
	Sig.	.000

According to the total variance outlined in Table 4, only Factor 1 (I intend to use ICT tools in teaching practices in the future) has a significant effect on teachers' application of ICT tools for teaching and learning. This factor accounts for 54.13% of the total variance in the utilisation of ICT tools (refer to the Scree Plot in Figure 2). The initial eigenvalue for Component 2 (I find it easy to integrate ICT tools into my teaching) is 0.846, representing 16.925% of the total variance. For Component 3 (It is easy for me to learn to use ICT tools in teaching practices), the initial eigenvalue is 0.619, which accounts for 12.373% of the total variance. Component 4 (I find it easy to troubleshoot ICT problems that occur during teaching practices) has an initial eigenvalue of 0.471, explaining 9.418% of the total variance. In contrast, Component 5 (I recommend using ICT tools in teaching practices to other teachers) has an initial eigenvalue of 0.358, which also accounts for 7.150% of the total variance, as indicated in Table 4.4.4.

Table 4.4.4: Principal Component Analysis of Factors that Influence Use of ICT Tools

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.707	54.134	54.134	2.707	54.134	54.134
2	.846	16.925	71.059			
3	.619	12.373	83.432			
4	.471	9.418	92.850			
5	.358	7.150	100.000			
Extraction Method: Principal Component Analysis.						

Table 4 provides a comprehensive view of how much of the total Variance in the dataset is captured by each principal component, aiding in dimensionality reduction and identifying the most influential factors in the data. In Principal Component Analysis (PCA), the significance of components is typically assessed based on their eigenvalues. A commonly used criterion is Kaiser's criterion, which suggests retaining components with eigenvalues greater than 1.

From Table 4, Component 1 has an initial eigenvalue of 2.707, greater than 1, indicating it is statistically significant. Components 2, 3, 4, and 5 have initial eigenvalues less than 1, which might suggest they are less significant individually. Component 1 is statistically significant based on Kaiser's criterion in influencing College Tutors' use of ICT tools.

Principal Component Analysis of Factors that Influence Use of ICT Tools

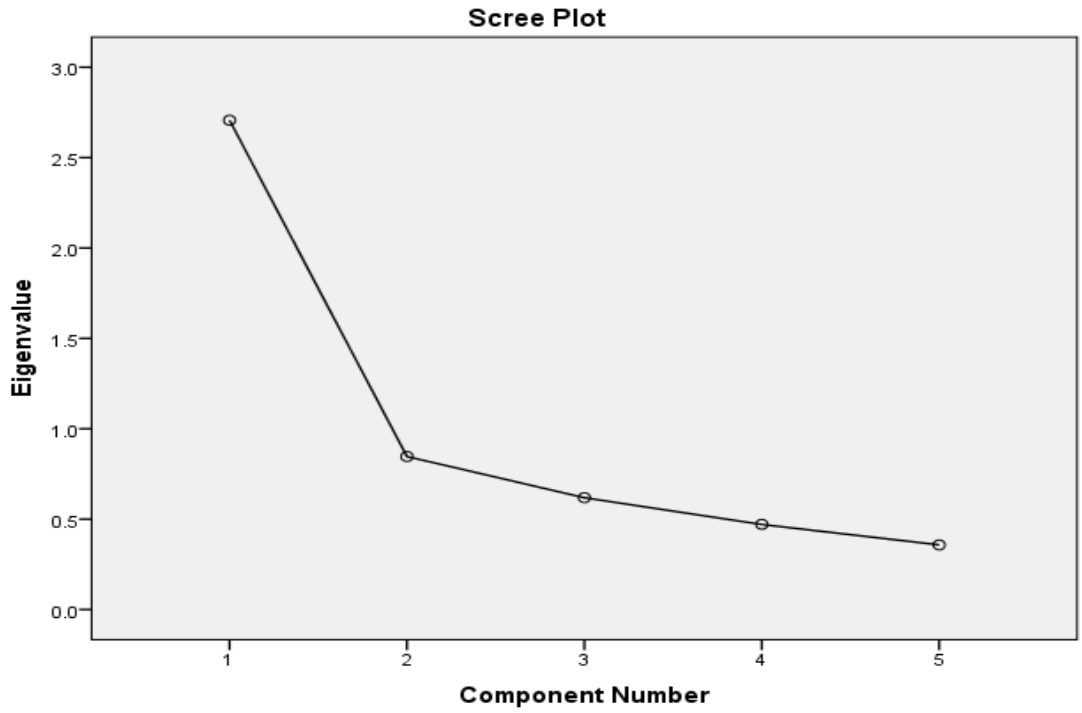

Figure 4.2: Scree Plot of Principal Component Analysis of Factors that Influence Use of ICT Tools

4.5 Discussions

4.5.1 The Level of Acceptance and Use of ICT Tools in Teaching Practices

The study confirmed that participants believe employing ICT tools in teaching enhances learning outcomes for tutors. Notably, these tools save time and effort, contributing to a feeling of efficiency and relief. They also make teaching more engaging. In terms of usage, the majority of respondents expressed their intention to incorporate ICT tools into their future teaching. They found it straightforward to integrate these tools, to learn how to use them, and to address any ICT-related issues during their teaching practices. Participants encourage other educators to adopt ICT tools in their teaching methods.

When assessing decision-making based on criterion means, the acceptance level of ICT tools in teaching practices was found to be high. Likewise, College

Tutors also exhibited a high level of ICT tool usage in their teaching methods. These results support the underlying principles of the Technology Acceptance Model (TAM) employed in this study. TAM aids Organisations in understanding and managing the adoption, acceptance, and use of new technologies (Sagnier et al., 2020). The framework is built on the notion that acceptance of new technology varies among individuals. Consequently, people's perceptions can range from positive to negative and are subject to change over time (Aydin, 2021).

Antonietti et al. (2022) confirm that the degree to which teachers perceive technology use as applicable is highly related to the intention to use digital tools in teaching practice. In addition, the results show that teachers' beliefs about their digital competence are positively related to their beliefs about technology's usefulness in teaching, which correlates with intention to use technology. Antonietti et al. (2022). Similarly, Soh (2020) found a relationship between the use of ICT and social influence, as there was a consensus among College Tutors that using Information and Communication Technology will enhance the quality of the teaching and learning process.

4.5.2 The Effect of Social Influence, System Characteristics and Individual Differences on the Extent of Acceptance and Use of ICT Tools for Instruction

This indicates that "Social Influence," "System Characteristics," and "Individual Differences" are statistically significant predictors of the variation in the dependent variable "Acceptance." For the prediction of "Use," the Regression Mean Square is 8.972, while the Residual Mean Square is 0.016. The calculated F-statistic is F = 573.907. This F-value demonstrates that the regression model significantly explains the variation in the dependent variable "Use." Additionally, the p-value is

near zero (p=0.000), which further supports the high statistical significance of the regression model.

The findings revealed that "Social Influence," "System Characteristics," and "Individual Differences" significantly account for the variation in the “Acceptance” and "Use" of ICT tools for instruction. The F-statistic was notably high, with a corresponding p-value near zero, suggesting a robust correlation between the predictors and the dependent variable.

In a related study, Soh (2020) indicated that Tutors who perceive a highly positive impact of ICT use ICT in the most project-oriented, collaborative and experimental way (Paul, 2002; Papert, 1987; Voogt & Pelgrum, 2005; Watson, 2001; Well-Strand, 1991).

Mirzajani et al. (2016) found that the successful implementation of Educational technology in colleges is not dependent on the accessibility or lack of one individual factor; it depends on a dynamic process involving a set of interconnected factors, such as sufficient support from administrators, ICT coordination, external forces, the educator’s commitment to using technology, the educator’s acquisition of ICT knowledge and support from administrators. Prensky (2001) also found that those teaching subjects such as computer, mathematics and sciences had a higher level of ICT use in the classroom.

Furthermore, Yang, Guo, and Cui (2023) found that teachers’ psychological perceptions and external support conditions positively influence the pedagogical application of ICT. Consequently, implementing ICT in teaching was directly impacted by college policies on reform and innovation, the communication climate among colleagues regarding technology use, the faculty promotion system, and teacher performance assessment mechanisms (Yang, Guo, and Cui, 2023).

4.5.3 Dominant factors that influence the acceptance and use of ICT tools

Principal Component Factor Analysis was conducted to identify the key factors influencing teachers' acceptance of ICT tools in Colleges of Education. Among the five components related to Acceptance, the analysis highlighted that the statements “Using ICT tools in teaching practices helps me to improve tutors' learning outcome,” “Using ICT tools in teaching practices saves time and effort,” and “Using ICT tools in teaching practices makes teaching more interesting” significantly impacted teachers’ acceptance of these tools for teaching and learning.

The Statement “I intend to use ICT tools in teaching practices in the future” substantially impacts how teachers utilise ICT tools in their teaching and learning. This factor accounts for 54.13% of the overall variance in teachers' application of ICT tools. The other four components related to ICT tool usage (Components 2, 3, 4, and 5) had initial eigenvalues below 1, indicating their lower significance.

The results support the conclusions of Deng et al. (2011), indicating that individuals are more likely to use ICT naturally and voluntarily when they believe that external support is accessible to them. Additionally, the actual use of ICT by College Tutors in their teaching is significantly influenced by teachers’ psychological perceptions, including performance expectations, effort expectancy, and their intention to incorporate ICT in their teaching methodologies (Li & Zhao, 2021; Zhou, Li & Wijaya, 2022).

Yang, Guo, and Cui (2023) found a significant and positive influence of external conditions on teachers’ actual use of ICT. Buabeng-Andoh (2012) identified multiple barriers that prevent teachers from adopting ICT, which can be divided into three categories: teacher-level, college-level, and system-level. Teacher-level barriers include insufficient ICT skills, low confidence in using technology, inadequate

pedagogical training, and a lack of follow-up on new and diverse training programmes. College-level barriers include missing ICT infrastructure, outdated or poorly maintained hardware, a lack of appropriate educational software, limited ICT access, minimal project-related experience, and the non-integration of ICT into college strategies. System-level barriers include the rigid nature of traditional educational systems, conventional assessment practices, restrictive curricula, and limited Organisational structures. Nassar, Othman, and Nizah (2019) found that staff and administrative personnel are highly receptive to integrating ICT into daily activities. However, they noted that social influence positively affects the intention to adopt ICT, while age hurts the relationship between social influence and behavioural intention.

The study validates the Technology Acceptance Model (TAM), a key framework for understanding individuals' acceptance of new technologies. This model outlines a five-step process for technology acceptance: perception, consideration, intention, action, and use. Each preceding step impacts the next, creating a continuous influence. When people first encounter a new technology, they experience perception (Albelisi et al., 2022). They might find it novel or intriguing, which can ignite their interest. During the consideration phase, individuals evaluate the potential benefits and drawbacks of the new technology and contemplate its integration into their lives. Intention represents the user's planned interaction with the technology after consideration. Action encompasses the actual use of the technology, ranging from reading guides to purchasing devices. Utilisation happens when individuals integrate technology into their everyday routines and apply its concepts creatively. Understanding each phase is crucial to grasping how people adopt new technologies; these phases form the TAM model (Sagnier et al., 2020).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 Introduction

This final chapter presents the summary, conclusions, and recommendations from the study's findings.

5.1.1 Socio-Demographics of Respondents

A total of 109 tutors from Colleges of Education participated in the survey. The sample primarily comprised 77 (70.6%) males, with 32 (29.4%) females, reflecting a male-dominated group. Participants aged 41 and older represented 36.7%, closely followed by those aged 36 to 40 at 35.8%. The youngest age group, aged 30 to 35, accounted for 27.5%, indicating that most respondents were over 35 years old. Regarding educational qualifications, most possessed master's degrees, while a smaller proportion held PhDs. More than half of the respondents had 10 to 20 years of teaching experience; 24.8% had 21 to 30 years, 19.3% had less than 10 years, and 2.8% had more than 30 years. The subjects taught by participants included Languages (8.3%), Mathematics/Information and Communications Technology (52.3%), Science (13.8%), Social Sciences (11.9%), Vocational (2.8%), and Education (11.0%).

5.1.2 The Level of Acceptance and Use of ICT Tools in Teaching Practices

The participants noted that incorporating ICT tools into teaching significantly enhanced tutors' learning outcomes. These tools saved time and effort and made the teaching experience more engaging. Moreover, they found it straightforward to utilise ICT tools. Regarding usage levels, most respondents affirmed their intention to continue employing ICT tools in their future teaching, appreciated the ease of integration into their lessons, and noted how simple it was to learn the necessary

skills. They felt capable of resolving ICT issues during instructional practices and wanted to recommend these tools to fellow educators.

Using a criterion mean of 3.0 for five-point Likert scale items for decision-making, the level of acceptance of ICT tools in teaching practices was rated high. In contrast, the use of ICT tools in teaching practices by College Tutors was also high.

5.1.3 The Effect of Social Influence, System Characteristics and Individual Differences on the Extent of Acceptance and Use of ICT Tools for Instruction

The data from the five-point Likert scale items regarding Social Influence, System Characteristics, and Individual Differences was compiled to calculate the overall means and standard deviations. The mean score for Social Influence was 4.16, System Characteristics had a mean of 3.77, and Individual Differences had a mean of 4.05. Analysis of Variance (ANOVA) was employed to assess the impact of these variables on the acceptance and use of ICT tools in teaching practices.

In predicting the variables of Social Influence, System Characteristics, and Individual Differences regarding Acceptance, the Mean Square for Regression was 3.042, while the Mean Square for Residual was 0.179. The F-statistic (F = 17.027) indicates that at least one predictor significantly influences the dependent variable. A p-value close to zero (p=0.000) confirms that the regression model is statistically significant. Thus, social influence, system characteristics, and individual differences are significant predictors of the acceptance of ICT tools in teaching practices. For predicting Use, alongside Social Influence, System Characteristics, and Individual Differences, the Regression Mean Square was 8.972, and the Residual Mean Square was 0.016. The F-statistic (F = 573.907) demonstrates that the regression model significantly explains the variation in the Use variable. The p-value was near zero (p=0.000), underscoring that the regression model is highly statistically significant.

These results indicate that social influence, system characteristics, and individual differences are crucial in elucidating the variations in using ICT tools for instruction.

The high F-statistic and the near-zero p-values suggest a robust relationship between the predictors and the dependent variable, indicating that "Social Influence," "System Characteristics," and "Individual Differences" directly impact how College Tutors accept and utilise ICT tools in their teaching practices.

5.1.4 Most dominant factors that influence the acceptance and use of ICT tools

Principal Component Factor Analysis was conducted to identify the key factors affecting teachers' acceptance of ICT tools in Colleges of Education. The analysis uncovered that among the five components related to Acceptance, the statements “Using ICT tools in teaching practices helps to improve tutors' learning outcomes,” “Using ICT tools in teaching practices saves time and effort,” and “Using ICT tools in teaching practices makes teaching more interesting” had a significant impact on teachers’ acceptance of these tools for teaching and learning.

Regarding the factors affecting the Use of ICT tools, the statement, “I intend to use ICT tools in teaching practices in the future, “significantly impacts teachers' utilisation of these tools for educational purposes. This aspect accounts for 54.13% of the total variance in teachers' application of ICT tools for teaching and learning. The other four components (2, 3, 4, and 5) had initial eigenvalues below 1, indicating they are less significant.

5.3 Conclusion

The study's first objective revealed a notably high acceptance of ICT tools among teaching practices. College Tutors also exhibited significant usage of these tools in their teaching methods. This conclusion arises from respondents' consensus

that ICT tools have enabled them to teach more effectively, enhance learning outcomes, save time and effort, create engaging lessons, and seamlessly integrate these tools into their instructional strategies. Regarding usage levels, respondents expressed their intention to continue utilising ICT tools in the future and noted their ease of incorporating these resources into their teaching. They further indicated that mastering the tools was simple, resolving issues during lessons was manageable, and they would recommend ICT tools to other teachers.

The findings from objective two indicate a robust link between the predictors and the dependent variable. This implies that "Social Influence," "System Characteristics," and "Individual Differences" significantly affect how College Tutors adopt and utilise ICT tools in their teaching. Participants note that their peers' use of ICT motivates them to adopt similar methods; additionally, parents and tutors appreciate the integration of ICT tools in educational practices. The college actively acknowledges staff who incorporate ICT into their teaching, and respondents believe the available ICT tools at their institutions are both high quality and user-friendly. They express confidence in using these tools and are skilled at addressing ICT-related challenges during their teaching. Moreover, they are eager to discover new ICT tools relevant to their instructional practices. The ICT tools provided at their colleges are similar to those in non-educational contexts, highlighting that Individual Differences, Social Influence, and System Characteristics impact College Tutors' acceptance and utilisation of ICT tools.

The study highlighted essential factors influencing teachers' acceptance and utilisation of ICT tools in Colleges of Education. Teachers emphasised that "Using ICT tools in teaching practices helps me to improve tutors' learning outcomes," "Using ICT tools in teaching practices saves time and effort," and "Using ICT tools in teaching

practices makes teaching more interesting." These sentiments significantly contributed to their acceptance of ICT tools. Furthermore, the statement "I intend to use ICT tools in teaching practices in the future" notably influenced teachers' intentions to integrate these tools into their teaching methods.

5.2 Recommendations

The research shows that both Individual Differences and Social Influence play a significant role in determining "Acceptance" and "Use." In contrast, while "System Characteristics" did impact acceptance, they showed a weaker connection to using ICT tools for instruction among College Tutors. The study found that College Tutors demonstrated a strong Acceptance of ICT tools for teaching, yet their actual usage of these resources was only moderate. Therefore, offering tutors orientation that addresses the identified variables is recommended.

Social influence

Tutors skilled in utilising ICT tools for instruction ought to be motivated to conduct TPL sessions, encouraging their colleagues to integrate these technologies into their teaching practices. Moreover, the schedule should allocate extra time for ICT lessons, guaranteeing that tutors have ample time to practice and adjust to this new technology.

Also, software such as simulations, games, and tutorials should be readily available and integrated into the system to enable tutors to understand the technology entirely.

System Characteristics

Management units across the Colleges of Education should facilitate access to ICT tools and offer support, enabling tutors to use them more effectively. The acceptance and use of ICT tools must be included as a criterion in tutor evaluations.

Individual differences

Before assessing training needs, conducting background checks on individual tutors, especially on their familiarity with ICT tools, is essential. This helps ensure that less knowledgeable tutors are not disadvantaged in group settings.

To summarise, research shows that college tutors in various education colleges in Ghana are generally open to and actively use ICT tools in their work. Nevertheless, several factors influence both the acceptance and utilisation of these tools, especially regarding improving tutors' learning outcomes, saving time and energy, and enhancing teaching engagement. Therefore, tutors' future plans to integrate ICT tools into their teaching practices greatly affect their present usage.

5.3.1 Suggestions for future studies

Future studies are strongly suggested to apply mixed methods to explore this research topic further.

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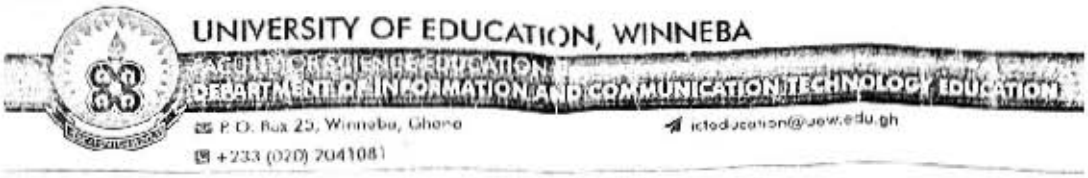
APPENDICES

Appendix A: Introductory Letter



UNIVERSITY OF EDUCATION, WINNEBA

P. O. Box 25, Winneba, Ghana

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11th January 2022

Dear Sir/Madam

LETTER OF INTRODUCTION: SOLOMON OFORI GYANE JNR. (220015147)

I write to introduce to you the bearer of this letter, Mr. Solomon Ofori Gyane Jnr. a postgraduate student in the University of Education, Winneba. He is reading for a Master of Philosophy degree in Information and Communication Technology Education and as part of the requirements of the programme, he is undertaking research titled – **The role of social influence, system characteristics and individual differences on the acceptance and use of ICT tools for instructional practices at the colleges of education.**

He needs to gather information to be analysed for the said research and he has chosen to do so in your institution. I would be grateful if he is given the needed assistance to carry out this exercise.

Thank you.

Yours faithfully,

HEAD OF DEPT.
DEPT. OF ICT EDUCATION
UNIVERSITY OF EDUCATION, WINNEBA

Charles Buabeng-Andoh

Ag. Head of Department

Appendix B: Consent Form for Tutors

UNIVERSITY OF EDUCATION, WINNEBA

Faculty of Science Education

Department of Information and Communication Technology Education

RESEARCH DESCRIPTION AND RIGHTS OF SUBJECTS CONSENT FORM FOR TUTORS

For questions about the study, contact: Solomon Ofori Gyane Jnr the researcher at solomongyane@gmail.com or 0244031360 **OR**

Dr. Osafo Apeanti Wilson, the research advisor at osafoapenti@googlemail.com or 0546443432

Description: You are invited to participate in a research study that aims at investigating the "**THE ROLE OF SOCIAL INFLUENCE, SYSTEM CHARACTERISTICS AND INDIVIDUAL DIFFERENCES ON THE ACCEPTANCE AND USE OF ICT TOOLS FOR TEACHING PRACTICES AT THE COLLEGES OF EDUCATION"**

Therefore, if you decide to participate in this research, you must complete a questionnaire.

Risk and benefits: The study involves no potential risks. The benefits are that you will have the opportunity to express your views about the **THE ROLE OF SOCIAL INFLUENCE, SYSTEM CHARACTERISTICS AND INDIVIDUAL DIFFERENCES ON THE ACCEPTANCE AND USE OF ICT TOOLS FOR TEACHING PRACTICES AT THE COLLEGES OF EDUCATION.**

Data storage to protect confidentiality: All the information to be gathered related to you will be treated in strict confidence. Your information will be confidential and will not influence your course grade. No information that could be used to identify you is required in the report of this study, either in writing or speaking.

How will results be used? The data collected from this study will be used to construct an MPhil thesis and journal articles.

Subject's rights: If you read this form and have decided to participate in this study, please understand that your participation is voluntary. You have the right to withdraw your consent or discontinue participation without penalty. You have the right to refuse to answer some questions in the questionnaire. Your privacy will be maintained in all published and written data from the study.

Signature statement: The researcher has answered all of my questions to my satisfaction. I consent to participate in the study described.

Signature:……

Date:…….....

The extra copy of this form is for you to keep

Appendix C: Questionnaire for Tutors of Colleges of Education

Dear Tutor of the College of Education, kindly take 20 minutes to complete this questionnaire. This questionnaire is to enable me to collect necessary information to complete my research on the topic under study:

THE ROLE OF SOCIAL INFLUENCE, SYSTEM CHARACTERISTICS AND INDIVIDUAL DIFFERENCES ON THE ACCEPTANCE AND USE OF ICT TOOLS FOR TEACHING PRACTICES AT THE COLLEGES OF EDUCATION

All information provided in this study will be treated as confidential, and your anonymity is assured. Completing this questionnaire does not result in financial gain. You can opt out at any time without any reason; however, I encourage you to complete it for me because it will help us improve the use of ICT in teaching at the Colleges of Education in Ghana. Thank you for your cooperation.

Section A: Socio-Demographic Characteristics

Please select or fill in your response.

1. Gender: Male [ ] Female [ ]

2. Age: (a) below 25 [ ](b) 26 to 30 [ ] (c) 30 to 35 [ ] (d) 36 to 40 [ ] 56 and above [ ]

3. Educational qualification: Bachelor's [ ] Master's [ ] Ph.D [ ]

Other (Specify)……

4. Teaching Experience:

(a) below 10 [ ] (b) 11 to 20 [ ] (c) 21 to 30 (d) above 30 [ ]

5. College of Education Taught: ……

6. Subject Taught: ……

Section B: Level of Acceptance and Use of ICT Tools in Teaching Practices

Select one of the responses to show the extent to which you agree with the statements below using the following guide: Strongly Disagree (SD); Disagree (D); Undecided (U); Agree (A); Strongly Agree (SA)

Using ICT tools in teaching practices helps me to teach more effectively (U)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

Using ICT tools in teaching practices helps me to improve tutors' learning outcomes (U)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

Using ICT tools in teaching practices saves time and effort (U)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

Using ICT tools in teaching practices makes teaching more interesting (U)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

It is easy for me to learn to use ICT tools in teaching practices (A)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

Using ICT tools in teaching practices is easy for me (U)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

I find it easy to integrate ICT tools into my teaching (A)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

I find it easy to troubleshoot ICT problems that occur during teaching practices (A)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

ICT improves the class climate (tutors are more engaged, less disruptive) (A)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

I intend to use ICT tools in teaching practices in the future (A)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

I plan to continue using ICT tools in teaching practices (A)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

I expect to use ICT tools in teaching practices regularly (A)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

I would recommend using ICT tools in teaching practices to other teachers (A)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

Section C: Effect of Social Influence, System Characteristics and Individual Differences on Acceptance and Use of ICT Tools in Teaching Practices

Select one of the responses to show the extent to which you agree with the statements below using the following guide: Strongly Disagree (SD); Disagree (D); Undecided (U); Agree (A); Strongly Agree (SA)

My colleagues use ICT tools in teaching practices, which encourages me to use them as well (I)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

My college encourages the use of ICT tools in teaching practices (C)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

The parents and tutors value the use of ICT tools in teaching practices (I)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

The use of ICT tools in teaching practices is supported by the government (C)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

The ICT tools available at my college are of good quality (C)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

The ICT tools available at my college are reliable (C)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

The ICT tools available at my college are easy to use (C)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

The ICT tools available at my college are compatible with the software I use (C)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

I feel comfortable using ICT tools in teaching practices (D)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

I am confident in my ability to troubleshoot ICT problems that occur during teaching practices (D)

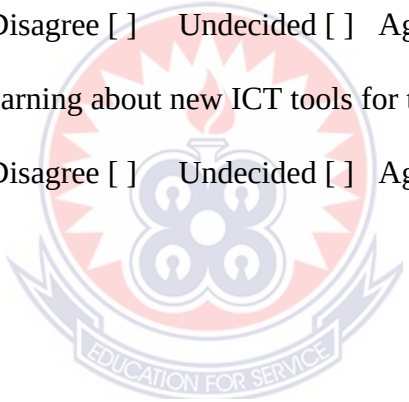
Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

I often use ICT tools outside of teaching practices (D)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]

I am not interested in learning about new ICT tools for teaching practices (D)

Strongly Disagree [ ] Disagree [ ] Undecided [ ] Agree [ ] Strongly Agree [ ]



End of questionnaire. Thank You