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Utilisation of online instructional technology by social studies tutors at selected Colleges of Education in Ghana during the Covid-19 pandemic Era

PHILIP OFOSU

DOCTOR OF PHILOSOPHY

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UTILISATION OF ONLINE INSTRUCTIONAL TECHNOLOGY BY SOCIAL STUDIES TUTORS AT SELECTED COLLEGES OF EDUCATION IN GHANA DURING THE COVID-19 PANDEMIC ERA

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A thesis in the Department of Social Studies Education, Faculty of Social Sciences Education, submitted to the School of Graduate Studies in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy (Social Studies) in the University of Education, Winneba

DECEMBER, 2023

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DECLARATION

Student's Declaration

I, PHILIP OFOSU, declare that this thesis, except for quotations and references contained in published works, which have all been identified and duly acknowledged, is wholly my original work and has not been submitted, either in part or whole, for another degree elsewhere.

Signature:

Date: …….

Supervisors' Declaration

I hereby declare that the preparation and presentation of this work were supervised following the guidelines for thesis supervision laid down by the University of Education, Winneba, Ghana.

Name: Professor David Naya Zuure (Principal Supervisor)

Signature: …….

Date: …….

Name: Professor Isaac Eshun (Co-Supervisor)

Signature: …….

Date: …….

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DEDICATION

This thesis is dedicated to all members of my family, particularly my wife, Professor Dr. Mrs. Juliana Daniels-Ofosu, and my son, Philip Kuuku Aseda Ofosu (Jr.). I humbly ask God's grace and blessings for their love, patience, support, encouragement, and understanding.

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GLOSSARY OF ACRONYMS

ACARA	:	Australian Communication Assessment Requirement Authority
ADDIE	:	Analyse, Design, Develop, Implement, and Evaluate
ADEA	:	Association for the Development of Education in Africa
AECT	:	Association for Educational Communication Technology
APHRC	:	African Population and Health Research Centre
AU/CIEFFA	:	African Union's International Centre for Girls and Women's
BODA	:	British Overseas Development Agency
CEO	:	Chief Executive Officer
CK	:	Content Knowledge
CoE	:	Colleges of Education
Coll.	:	College
COVID-19	:	Coronavirus Disease of 2019
CP	:	College Principal
DTLS	:	Distance Teaching and Learning Systems
Edn.	:	Education Education in Africa
ERT	:	Emergency Remote Teaching
FGD	:	Focus Group Discussion
Generation Z	:	The children born between 1995 and 2010 who use the Internet to
GES	:	Ghana Education Service
GPE	:	Global Partnership for Education
GTEC	:	Ghana Tertiary Education Commission High-Income Countries
ICT	:	Information Communication Technology
IDT	:	Innovation Diffusion Theory

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ISTE	:	International Society for Technology in Education
IT	:	Information Technology
ITE	:	Initial Teacher Education
LMICs	:	Low- and Middle-Income Countries
MoU	:	Memoranda of Understanding
NaCCA	:	National Council for Curriculum and Assessment
NCTE	:	National Council for Tertiary Education
OIT	:	Operator Interface Terminal
PA	:	Public Address
PD	:	Professional Development
PK	:	Pedagogical Knowledge
PoCoE	:	Principals of Colleges of Education
PU	:	Perceived Usefulness
SST	:	Social Studies Tutors
TA	:	Technology Acceptance
TAA	:	Technology Acceptance and Adaptation
TAM	:	Technology Acceptance Model
TCK	:	Technological Content Knowledge
TK	:	Technological Knowledge
TPACK	:	Technological, Pedagogical, and Content Knowledge
TPK	:	Technological Pedagogical Knowledge
TR	:	Technology Rejection
T-TEL	:	Transforming Teacher Education and Learning
UN	:	United Nations
UNESCO	:	United Nations Educational Scientific and Cultural Organization

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UNICEF : United Nations International Children's Emergency Fund

Zoom, also known as Zoomers, is digitally Inclined.

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ABSTRACT

This study investigated the use of online instructional technology by social studies teacher educators in five selected Colleges of Education (CoE) in Ghana during the COVID-19 pandemic. Grounded in the interpretive philosophical perspective, which prioritises individuals' subjective experiences as the primary means of understanding phenomena, this research employed an existential-phenomenological approach. This approach utilised interpretive and inductive processes, informed by Davis's Technology Acceptance Model (TAM) (1989) and Rogers's Innovation Diffusion Theory (IDT) (2003), to gain insight into participants' lived experiences with online instructional technology during the pandemic. Out of the five CoE involved in the study, a sample of 35 participants (10 tutors, 20 students, and five college principals) was selected from a population of 2,249. Data collection techniques included observation, interviews, and focus group discussions. The study's findings indicate that most tutors utilised online technology platforms, such as Learning Management Systems (LMS), Zoom, WhatsApp, and Google Meet, to sustain academic work during the pandemic. Moreover, some tutors consistently integrated technology into their lessons during the period. The study concludes that tutors require technical support, quality connectivity, and equipment to overcome the challenges of using online instructional technology to enhance Social Studies teaching and learning in Ghanaian Colleges of Education (CoE). The study recommends prioritising technological innovations in instruction in Ghanaian CoE to address technological needs. Furthermore, tutors should be motivated by the CoE administrative set-up to consistently use and adapt online instructional technology tools alongside traditional face-to-face methods, even in the post-pandemic era, to ensure the sustained use of online technology in instruction.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The integration of Information Communication Technology (ICT) in Ghana's educational system, as directed by the new national curriculum policy, has necessitated a change in the instructional process of schools. Over the past few decades, instructional delivery mediums and tools have undergone significant changes (Fouts, 2000). Fouts stressed that it is widely known that different forms of instructional delivery innovations, such as slates, chalkboards, marker boards, tabletops, laptop computers, tablets, smartboards, and other smartphone devices, to mention a few, exist. However, a few have and continue to characterise the instructional delivery landscape in the educational system for quite some time now. Therefore, it must be stressed that "technology" and "innovation" as used in the context of this investigation relate to "the use of computer-related equipment, tools, and internet facilities in instructional delivery".

As traditional face-to-face instruction was disrupted in many parts of the world due to COVID-19, online technology became a vital tool for ensuring the continuity of teacher education. Hence, a few of the ensuing paragraphs analyse the incidence of COVID-19 and the integration of technology into instruction by Colleges of Education (CoE) teachers in some countries around the world, in general, and in Ghana, in particular, to sustain instruction.

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), also known as Corona Virus Disease 2019 (COVID-19), according to Emrani et al. (2021), is a disease or respiratory illness responsible for the COVID-19 pandemic. They indicated that the virus previously had the provisional name coronavirus (2019-nCoV), and has

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also been called human coronavirus 2019 (HCoV-19 or hCoV-19). It is on record that the COVID-19 pandemic, which emerged in late 2019 in Wuhan Province, China, had fatal and global effects as it spread from an endemic community (Yu & Jee, 2021).

According to UNICEF (2021), as of 12 January 2021, approximately 825 million schoolchildren worldwide had their schools closed down in response to the pandemic, with nearly 2 million deaths. This highlights the severity of the pandemic and the danger it posed to educational processes and activities worldwide. An exploratory journey to Europe, North and South America, Asia, and Africa revealed the following manifestations of the pandemic on teacher education;

During the brief period of the COVID-19 pandemic, various investigators have made their findings on instructional processes available in diverse ways (Pokhrel & Chhetri, 2021). They add that several schools, colleges, and universities have discontinued face-to-face teaching. Pokhrel and Chhetri again emphasised that the looming fear of wasting the 2020/2021 academic year, or even more in the future, was not downplayed. They suggested that momentarily, there was a need to innovate and implement alternative educational systems and assessment strategies to sustain academic work. The COVID-19 pandemic provided the world with an opportunity to integrate digital instruction into various academic calendars around the globe. Hence, this segment of the investigation aims to provide a perspective on the occurrence of the COVID-19 pandemic at various periods and its impact on teacher education.

A review of a study on the loss of instructional hours during the pandemic by Contini, Di Tommaso, Muratori, Piazzalunga, and Schiavon (2021) revealed that there was evidence of a loss of instructional hours averaging 0.17 standard deviation in the period of the pandemic for 32 out of the 35 low and middle-income countries

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(LMICs) and higher-income countries (HICs). The breakdown reveals that LMICs experienced a greater loss than HICs (Donnelly & Patrinos, 2022). LMICs involved in the review include Mexico, with a 0.55 standard deviation loss and Brazil, with a 0.32 standard deviation loss, according to Donnelly and Patrinos. From the point of view of Donnelly & Patrinos (2022) and Schult et al. (2022), even in high-income countries like the Netherlands, Belgium, Germany, and Italy, where distance instruction was feasible, Colleges of Education (CoE) tutors' and other teachers' instructional outcomes fell short of their usual standards. This indicates the pandemic's negative impact on education, even in technologically advanced economies.

The need, therefore, for college tutors to swiftly adapt to a more vigorous and newer context of online instruction is a concern for all as instructors look for ways to overcome the stumbling block posed by the COVID-19 pandemic in unexpected settings (Carrilo & Flores, 2020). It is therefore important to throw light on how teaching activities have adapted to the restriction in communication and progressed to innovative traditions, as voiced out by Rogers (2003), in teaching situations characterised by uncertainty (Flores & Swennen, 2020), as the case of the CoE may be, due to the COVID-19 pandemic.

Also, from the perspective of Maguire and Pardiwalla (2021), critics voiced that the United Kingdom (UK) government was slow to contain COVID-19 by acting contrary to scientific advice. Consequently, the country recorded one of the highest COVID-19 death tolls in Europe and ranked fifth globally. Maguire and Pardiwalla echoed further that *COVID-19 inhibited the smooth operation of several educational institutions in the U.K. from functioning regularly in their usual conventional in-

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person instructional process and resorted to online tuition. This occurrence tells how devastating the incidence of COVID-19 was to human life.

Due to the COVID-19 pandemic lockdown in Germany, many colleges and schools were temporarily closed in March 2020 (Konig, Jarger-Biela, & Glutsch, 2020). The wide closures of schools happened when swift changes generally influenced technological advancements and digitalisation, which had never been experienced in educational circumstances (McFarlane, 2019). Konig et al. (2020) report that all the teachers taking part were in contact with students and their parents, as most indicated that they were familiar with a new technological mode of instruction, engaging in activities and responding to their students. Nevertheless, McFarlane (2019) mentioned that online technology applications in instructional processes were somewhat learned. This assertion by McFarlane was quite laudable in the circumstances in which CoE teachers and students find themselves. König et al. (2020) conclude that teachers' insight into using digital tools in instruction and the opportunities to acquire some digital knowledge were decisive in adjusting to online instruction. Therefore, teacher proficiencies in digital instruction are vital for effective online educational processes.

In the Netherlands, van der Spoel, Noroozi, Schuurink, and van Ginkel (2020), in their findings on a study aimed at analysing college teachers' perceptions of their online instructional prospects and experiences, revealed noteworthy occurrences relating to their resolve to integrate technology in their lessons even in a post-COVID-19 era.

In the United States of America (USA), Akter (2022), in a report of her findings on "transitioning to online teaching during the COVID-19 pandemic: a mixed methods Study on teachers college faculty experiences", stated that most participants that made

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this transition grew both in their ability to use technology and comfort with teaching online. The participants described the experience as a challenging transition, especially as there was little time to prepare. According to Akter's findings, the participants could use technology in the teaching process while transitioning and in the comfort of their respective homes. So, the question that came up in the case of this study was, "What was the situation like in the case of the tutors in the selected CoE in their instruction since the USA is a technologically advanced economy while Ghana is an emerging economy in terms of technology utilisation in instruction, and as such, is not privileged with the level of technological exposure about the USA. That also instigated this study. Again, Akter used the mixed method, while this study employed the qualitative approach. Although the two studies' focus varies in approach, they have similarities in how the colleges transitioned during the pandemic in their instructional responsibilities. This situation also offered an opening for this study to explore what pertained to the circumstances of the colleges in Ghana.

Moreover, in the middle of March 2020, in South America, twenty-six state governments authorized the shutdown of schools in Brazil to ensure no in-person instruction, affecting over 35.2 million children and adolescents (Barberia, Costa, & Sabino, 2021). According to Barberia et al., remote instructional programmes were implemented with considerable delay and limited attention to guaranteeing access to education. Only 81% of Brazilian households had access to the Internet, with 60% relying on cellular phones for digital access (Barberia et al., 2021). "Unequal access to digital tools, connectivity, and lack of training imposed unseen challenges for governments, schools, and teachers to engage students in long-distance education during the COVID-19 pandemic (The World Bank, 2021)". "Such abrupt change

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affects all actors, including those in the CoE system" (Kharas & Bhattacharya, 2020). So, the CoE case was no exception.

As records earlier indicate, the COVID-19 pandemic was the most disruptive event experienced by colleges of education teachers and students in living memory (Mulder, Bone, French & Connelly, 2023). Consequently, teacher educators at the Melbourne Graduate School of Education, University of Melbourne, adopted a range of synchronous and asynchronous delivery methods and refined these in subsequent iterations of their subjects (Mulder et al., 2023). This situation necessitated the use of technologically viable online options, such as YouTube videos, WhatsApp videos, Zoom video conferencing, Skype, Google Classroom modules, and other learning management systems (LMS), to sustain instruction since little to no physical contact hours were allowed.

According to Scull et al. (2020), adopting new technological and pedagogical practices in virtual schooling to sustain the instructional environment was vital, urgent, and necessary during the COVID-19 pandemic. In their assessment, La Velle, Newman, Montgomery, and Hyatt. (2020) maintain that calls to implement these technological and pedagogical innovations were based on existing research and professional practice traditions, such as online education, 'e-learning', or critical digital pedagogies.

However, the early 2020 editorial for the Journal of Teacher Education, Floden, Richmond, and Salazar (2020, p. 169) noted that "a 'pessimistic' interpretation of the situation was that teacher educators do not know how to make productive changes". This suggests that effective instruction in colleges worldwide relies heavily on the skills of teachers in their respective fields and their awareness of the available

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technology and tools (De Beer & Collins, 2005). De Beer and Collins's assertion also suggests that the immense role of online instruction at the CoE during the COVID-19 pandemic was vital. By implication, teacher education authorities are responsible everywhere to ensure that technologically oriented, pedagogically shrewd, and content-imbued teachers are trained.

Notwithstanding, the contention made by Floden et al., among other related studies by other authors, was subjective in its practical sense. Equally, Mulder, Bone, French, and Connelly's (2023) subsequent remark that the application of online educational technology has tremendously improved among many teacher training institutions was also a cause for this investigation.

What was the situation like regarding their CoE system in Africa and Ghana? In congruence, Africa also had its 'fair share' of the COVID-19 pandemic and its disruptive consequences in colleges. During the crisis, a collaboration between the Global Partnership for Education (GPE) and a number of countries in Africa emerged to develop an educational response and support, aiming to counteract the pandemic (ADEA, AU/CIEFFA, & APHRC, 2022). Consequently, the collaborative efforts came up with the following;

Using various technological mediums as distance teaching and learning tools, identified by GPE, enabled all teachers, including teacher educators, to sustain instruction during school closures (ADEA, AU/CIEFFA, & APHRC, 2022). It was further agreed that teachers' capacity, including those in the CoE, in using technological tools and approaches should be built (ADEA, AU/CIEFFA, & APHRC, 2022). Efforts geared towards preparing instructors with the capacity needed to engage learners in distance instructional procedures were encouraged by governments

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and development partners such as GPE and the World Bank (ADEA, AU/CIEFFA, & APHRC, 2022). They reiterated that capacity-building events in technological gadgets, such as smartphone application services, should be encouraged in various WhatsApp facilities, including WhatsApp Video Conferencing, WhatsApp Video Chats, and WhatsApp Text Messaging, as well as other online digital tools like Google Classroom, Zoom, and YouTube. Through it all, barely eleven out of the forty countries trained their teachers on using these tools for online instruction (GPE, 2020).

However, the provision of digital devices by governments was not common among GPE partner countries in Africa (GPE, 2020). Only a few of the eleven countries reported making available digital teaching and learning tools such as tablets, computers, laptops, and Internet bundles for access to either teachers or learners. Those countries include Cabo Verde, Ghana, Somalia (Somaliland and Puntland), Sudan, and Togo (Government of Ghana, 2020; Government of Somalia, 2020; Government of Sudan, 2020; Government of Togo, 2020; GPE, 2020). In Sudan, for instance, teachers were furnished with tablets. It is established that there was evidence of training offered to some of the African CoE teachers on interim distance instructional technology usage capacity building for their colleges. However, as the policy indicated, not all the teachers, including those in the CoE, benefited from the training programme.

Again, the policy indicated that the private sector was the driving force behind expanding access to digital technology in many parts of Africa. Unfortunately, inaccessibility to electricity was in contrast to the digital infrastructure and fibre optic cable (Ngware & Ochieng, 2023). Consequently, gaps were created in accessing online instruction. Notably, Ngware and Ochieng mentioned the neglect of the hinterlands like Kenya's remote and bucolic areas to access these facilities, resulting

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in limited use of DTLS despite attempts by the Vodafone Foundation and UNHCR to provide the instant network schools programme through the training of CoE teachers. This situation affected many CoE teacher trainees who dwell in the remotest parts of Kenya. This deprived the teachers of access to the facilities they had been trained for distance instruction during the school closures. Notwithstanding, according to Chebib, the government did not provide digital solutions in GPE-collaborated African countries, despite Zobeidi et al.'s (2023) claim that online instructional systems had become the sine qua non for presenting the subject matter in instruction.

South Sudan also offered undisclosed sums of money to its teachers to motivate them to continue providing services to its learners during the school closure (ADEA, AU/CIEFFA, & APHRC, 2022). According to ADEA, AU/CIEFFA, and APHRC (2022), La Cote d'Ivoire embarked on intensive capacity building to enable teachers to deliver lessons using innovative approaches, not bound by physical space.

In Sierra Leone, approximately 12,000 teachers were trained to use various DLS platforms for teaching and administration, ensuring continued learning during the school closure period (GPE, 2020). By implication, incentives made available to the facilitators helped sustain instruction to some extent. However, from the foregoing discussion, it was noted that numerous efforts were made in some African countries to sustain academic work in schools, including teacher education, during the COVID-19 pandemic.

Consequently, from the perspectives of some authors, the influence of the COVID-19 pandemic at the global level was a significant surprise to the entire teaching fraternity and, to some extent, accorded them the opportunity to engineer possible antidotes to some of the problems they have not encountered before (Flores & Swennen, 2020).

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Hence, their assumptions give insight into the intricacies and complex responsibilities CoE teachers bumped into at the beginning of the COVID-19 pandemic and what **they contended with in the subsequent periods.

Nonetheless, it was concluded that the respective governments of Africa and the implementation bodies contributed positively to sustaining academic work at the CoE despite the numerous challenges they encountered. Similarly, Ghana's experience with* school closures and academic sustenance was not different from that of the rest of Africa (Government of Ghana, 2020).

On the 15th of March, 2020, the President of Ghana, Nana Addo Dankwa Akufo-Addo, ordered the closure of all education institutions in Ghana, affecting some 9.2 million basic school students (kindergarten, primary, and junior high schools) and 0.5 million tertiary education students (UN, 2020). The UN again reported that by the 10th of May 2020, Ghana had recorded 4,700 confirmed cases of COVID-19 (UN, 2020). Afterwards, a prediction of an upsurge of the disease, according to the UN, was made by health specialists. As a result, only candidates for the Basic Education Certificate Examination (BECE) and the West African Senior Secondary School Certificate (WASSCE) Examination were permitted to stay in school under social distancing protocols. A clear manifestation of change in the cultural setting of a good number of teachers, learners, parents, and almost all physically interacting social activities around the world instigated remote teaching from any favourable and arranged instructional environment with the learners.

Contributing to the discourse, Asamoah, Osafo, and Agyekum's (2023) findings and conclusion on a study on "psychological and educational effects of the COVID-19 pandemic on online students and faculty of a Ghanaian university" finding and

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conclusion that "participants expressed fear in educational disruptions and worries involved in online teaching and learning", and concludes that "the upsurge of COVID-19 has triggered psychological, economic, and educational conundrums that have to be addressed". Their findings indicate that disruptions and concern were expressed in the effectiveness of online teaching and learning, leading to psychological, economic and educational conundrums. This finding and conclusion concerned all in academia, including teacher education in Ghana, regarding general students' welfare in their educational endeavours. So, the case of CoE teachers and students in this study may also be applied to the findings and conclusions drawn by Asamoah et al.

Equally, in a study by Atakorah, Honlah, Atta Poku Jr, Frimpong, and Achem (2022) on "the perspective of Seventh-Day Adventist College of Education in Ghana", their finding was that a majority of the students perceived that COVID-19 negatively affected their studies. Hence, they suggested that the government and telecommunication companies should work together to improve communication and internet services in the country to facilitate online studies. In their finding, particular mention was made of the students, but the tutors' perspective was not stated. So, this study sought to inquire how the selected CoE tutors facilitated their instruction during the same period.

So, as a matter of urgency and in response to the school closures, according to UNESCO (2020), the use of distance instructional programs, online educational application platforms, and other information communication technology platforms that schools and teachers can resort to reach learners remotely and limit the disruption

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of education was highly endorsed. Consequently, CoE instructors scrambled to find creative solutions to teaching students online to sustain their work academically.

1.2 Statement of the Problem

The world is driving towards online technology-based instruction in many educational establishments. Kemp (2000) argues that CoE tutors serve as role models, so "for pre-service teachers to demonstrate technology competencies, teacher education faculty must themselves model the use of technology in their teaching" (p. 11). Kemp's assumption establishes a lacuna in the use of technology among college tutors, who, in the process of employing technology during the uncertain times of the COVID-19 pandemic, portrayed how the absence of in-person instruction can effectively be dealt with by resorting to distance instructional modules solutions.

Again, Starkey, Shonfeld, Prestridge, and Cervera (2021) indicated that when the COVID-19 pandemic swept the world in 2020, schools closed, and students' homes became the education hub. Accordingly, numerous colleges of education in nations faced the challenge of an unexpected and enhanced change to technology-assisted instruction. In this instance, the dispensation characterises a decisive period to replicate technology in pedagogy.

Another gap was created in this instance that the study intended to fill. How was the technology used by the Social Studies tutors at the Colleges of Education to sustain instruction amid the pandemic?

Similarly, Amarh (2022), in a publication titled; "Assessing the impact of COVID-19 on teaching and research: A Ghanaian perspective", stated that the COVID-19 pandemic in diverse ways affected the traditional modes of instruction at all levels of education, including colleges. Further, Amarh maintained that among the innovations

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necessitated by the pandemic was the increased use of virtual teaching and learning methods. This situation, revealed by Amarh, depicted the urgent need to transition the process among the colleges of education from in-person to technological modes of delivery to ensure instructional sustenance.

Starkey et al. (2021) further contributed to the discourse, indicating that digital technology significantly helped teachers teach from a distance. This contribution by Starkey et al. also adds impetus to this study's quest to establish if the Social Studies tutors at the CoEs in the study utilised one form or another of online technology to sustain instruction during the COVID-19 pandemic.

Further empirical literature from countries worldwide suggests that online instruction existed alongside in-person instruction before the COVID-19 pandemic. In support of this assertion, Mamattah's (2016) study on "Students' perceptions of e-learning" highlights how e-learning has thrived side-by-side with in-person among college teachers and students in the educational system of Sweden. Again, Chang, Hajiyev, and Su (2017) study "examining the students' behavioural intentions to use e-learning in Azerbaijan", exhibiting students' intents and reactions to online learning activities within their instructional culture before the pandemic; Salloum, Al-Emran, Shaalan, and Tarhini (2019) in their study "factors affecting the e-learning acceptance: a case study from UAE"; and Henaku (2020) study on " online instructional experiences of college students: The case of Ghana"., depicts scenes of online instruction before the COVID-19 pandemic.

Notably, all these empirical studies took place without COVID-19 protocols, such as social distancing and school closures, which restricted social and other human interactions in public. Moreover, both teachers and students experienced instruction

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under different environmental conditions where online pedagogical activities were not mandatory and strictly enforced. In-person instruction, the most preferred by teachers and college students, was also run alongside the online version. This situation also creates a gap in answers, as the COVID-19 pandemic is an uncertain period during which in-person instruction was temporarily prohibited, leaving online instruction as the only option. So, this emergency presented a different scenario under which instruction should be carried out. Hence, there is a need to investigate how the CoE tutors managed to sustain instruction under such conditions.

1.3 Purpose of the Study

This research investigated how Social Studies tutors in some selected CoEs in Ghana adapted to online instruction during the COVID-19 pandemic era. Therefore, how the tutors modified their instructional delivery to suit the situation at the time was the primary focus of this study.

1.4 Objectives of the Study

The research sought to:

1. eplore the instructional technologies tutors employed in their teaching activities during the COVID-19 pandemic.
2. analyse how tutors perceived learners' reactions to their online instructional technology in pedagogy.
3. investigate the challenges tutors face in incorporating online instructional technologies into their lessons during the COVID-19 pandemic.
4. investigate the institutional support available to faculty for incorporating technology into instruction.

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1.5 Research Questions

The study was primarily grounded on the following research questions:

1. What instructional technologies did the tutors of the colleges employ in their teaching activities during the COVID-19 pandemic?
2. How did the tutors perceive learners' reactions to using online technology in pedagogy?
3. What challenges did the tutors face in using online instructional technologies during the COVID-19 pandemic?
4. What institutional support was made available to faculty for the use of online instructional technologies during the COVID-19 pandemic?

1.6 Significance of the Study

The investigation holds significant importance for stakeholders, including the Principals of the CoE, the Ghana Education Service (GES), investigators, tutors at the CoE, students, other tertiary education teachers, and the general public. The findings of the study would, therefore, be beneficial to the interest groups mentioned in the following ways:

First, the study provides insight into the stakeholders of the country's teacher education, including the MoE, tutors, and students, regarding their competence in online instructional technology during the COVID-19 pandemic. Therefore, as a driving force, this study was conducted to aid the faculty and college Principals in determining what they may want to know, realise, and ponder as they strive to improve teacher education. Hence, it outlines strategies for enhancing online teacher education programmes, building resilience in the face of future disruptions, and ultimately improving the quality of teacher education in Ghana.

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Again, this investigation serves as a vehicle for comprehension of some of the issues relating to educational technology utilisation to Ghana Tertiary Education Commission (GTEC), GES, college administrators, tutors, researchers, and students, as it advances public awareness and understanding of contemporary social development issues. By doing so, the study could contribute to the knowledge and information hub on the technology competencies of tutors in colleges of education.

Among the teaching professionals in academia, in particular, and the reading public in general, laying hands on thought-provoking and engaging topics, as presented by the study's findings, to discuss and possibly write about, transcends personal experience. Insights into technology utilisation in education in times of emergency would enrich their knowledge on the topic and different viewpoints towards technology usage in instructional settings.

The investigation could also serve as a supporting document for stakeholder knowledge construction on teacher education. It draws the attention of the Ministry of Education, represented by GTEC, non-governmental organisations (NGOs), and other philanthropists into the revelations of the investigation, which could be an added impetus to the GTEC and other NGOs like Right To Play (RTP), towards the creation of awareness on the basic instructional, and technological needs in the modern teacher education process. Therefore, it could serve as a source of knowledge to update themselves on the pressing needs of this field of academia and to make informed decisions to help mitigate some of their challenges, thereby improving teacher education in general.

The findings could also serve as a benchmark for future research into the utilisation of instructional technology in teacher education. By implication, the findings could serve

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as a vehicle for understanding some of the pertinent issues related to the application of educational technology in instruction. This will help the would-be researchers and the reading public understand contemporary social development matters in teacher education. As such, some of the issues that were not apparent at the time of the study but have become relatively more evident as time evolves, in terms of some of the emerging problems arising from the use of technology in instruction in teacher education, would be clearly understood. This situation could allow would-be researchers to suggest plausible ways in which such problems could be handled appropriately.

1.7 Delimitation of the Study

The investigation was focused on exploring online teaching by Social Studies tutors in selected colleges of education in Ghana during the COVID-19 pandemic. It further tried to find answers to the research questions posed, which have to do with online technologies tutors utilised in their instruction during the pandemic, frequency of use of the technological tool, the rationale for the tutors' choice of the technology, tutors' perspective of the feedback from learners on the technology used, the challenges they faced in their usage of the technology during the COVID-19 pandemic, and the support systems available to faculty in their attempt to integrate technology into instruction.

The essence of limiting the geographical scope to cover the public colleges in the Bono, Bono East, and Ahafo Regions was conceded from the view that, as academic research, it was to be completed within a one-year time frame for me to submit my final work. Given this, covering a wide range of CoE in the country became challenging in that short period. Hence, I decided to confine the research to a limited number of CoEs in the study, enabling me to complete it within the stipulated period

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and avoid any penalties associated with late submission of the final dissertation to the School of Graduate Studies.

1.8 Operational Definition of Terms

Instruction - The process of teaching, guiding, and facilitating learning experiences for students.

Technology - The use of computer-related equipment, tools, and internet facilities in instructional delivery.

COVID-19 - Coronavirus Disease 2019 is a respiratory illness caused by the SARS-CoV-2 the virus was first identified in Wuhan, China, in December 2019 and has since become a pandemic.

Pandemic - Is a widespread outbreak of a disease that affects a large number of people across multiple countries or even continents

Mediums and Tools - Various channels, platforms, and instruments used to convey information, facilitate communication and support teaching and learning process.

Internet - A global network of interconnected computers and servers that communicate with each other using standardised protocols.

Connectivity - The ability of devices, systems, or people to communicate and exchange information with each other.

Zoom Video Conferencing - A popular video conferencing platform that enables remote meetings, virtual events, and online collaborations

Google Classroom Module - A free web-based platform that integrates with Google Workspace to help educators manage assignments, track student progress, and enhance communication.

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Learning Management System - This is a software application designed to manage, track, and deliver educational courses, training programmes, and learning development initiatives.

Online Educational Technology - The use of digital tools, platforms, and sources to enhance teaching, learning, and education

Professional Development - Ongoing process of learning, training, and development that professionals undertake to enhance their skills, knowledge, and performance in their current or future roles.

PowerPoint slides - A popular presentation tool used to convey information, ideas, and messages in a visually engaging way.

Proponents - Individuals or groups who support, advocate, or promote a particular idea, cause, policy, or product.

Pedagogy - Science and art of teaching, encompassing the methods, strategies, and philosophies that educators use to facilitate learning and development in their students.

Pedagogical Innovations - They are new or different approaches to teaching and learning that aim to benefit student experience outcomes and transform the way teachers and students interact in an instructional environment.

ICT - Using digital technologies to manage, process, and communicate information.

Global Phenomenon - A significant event, trend, or issue that affects people, societies, or environments worldwide.

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1.9 Organisation of the Study

The investigation is in five chapters. The first Chapter presents the background of technology integration in education in the Ghanaian context, the statement of the problem, the purpose of the investigation, the objectives of the study, the research questions used, the significance of the investigation, the delimitations to the study, and the operational definition of terms and acronyms. The literature review on modern instructional technologies is situated in the second Chapter. The theoretical review was also addressed in the second chapter. It further draws scholarly inferences from secondary sources of empirical and published data. Chapter three presents the methodology and research tools employed in the study. It discusses the research paradigm, the philosophical underpinnings of the study, the research approach, the research design, the research setting, the population of the study, the sample and sampling procedure, instruments for data collection, the trustworthiness of data collection, data collection procedure, data analysis, ethical considerations, sources of data collection, and limitations to the study. The fourth chapter analysed and discussed data obtained from the participants and reviewed the related literature. The fifth and final chapter accommodates the research's summary, conclusions, and recommendations.

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CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviewed the literature relevant to the realisation of the research objectives. The conventional review approach was used to gather the relevant secondary data to establish the gap for the investigation. The conceptual framework of this investigation followed a review of the theoretical foundation for the study. Hence, the subsequent themes reviewed in the literature were informed by the research questions reworded in themes. This chapter ended with the identified gaps in the literature reviewed, which subsequently necessitated this investigation.

2.1 Theoretical Framework

Even though the emphasis on technology application in Social Studies instructional environment is of much concern, the usage of technology in the corridors of Social Studies has not gone down too well (Hicks, Hover, Doolittle, & VanFossen, 2012). This assumption by Hicks et al. suggests that much need to be done on technology integration into Social Studies education by their instructors. In light of this assumption, an investigation was conducted on “online teaching by Social Studies tutors at selected colleges of education in Ghana during the COVID-19 pandemic”. This attempt explored how the tutors at the selected colleges managed to sustain instruction during the pandemic. In the process, Davis’s Technology Acceptance Model (TAM) (1989), Rogers’s Innovation Diffusion Theory (IDT) (2003), related concepts put forward by other authors on technology integration into instruction influenced this investigation.

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To begin with, TAM, which was theorised by Davis (1989), proposed that when manipulators observe that a kind of technology is beneficial and easy to use, they will be eager to practice it in the activities they intend to do. Therefore, as users recognise that the work processes will be easy to undertake, the greater the possibility of their adoption and adaptation to innovative technology becomes valuable (Dillon & Morris, 1996), as cited in Ajibade (2018).

2.1.1 Technology Acceptance Model (Davis, 1989)

It is widely acknowledged that models represent efforts to explain the world by perceiving phenomena and striving to understand how they are (Anderson, Curtis, & Wittig, 2014). Acceptance of a theory influences how investigators perceive and interpret spectacles in terms of the values advocated by the model. These models enhance investigation and allow for guesses and extrapolations to be made, which are verified by the outcomes of investigative studies (Myerson, 2013) and provide descriptive contexts. The philosophy about a feature might denote a body of commonly recognised information (Thomas, 2007), and a well-formulated clarification can describe it scientifically, allowing the model to be tested (Schafersman, 1994). Therefore, authors and researchers define a hypothetical framework in various ways, based on how it is created, and provide the theoretical foundations of investigative studies. From D'Amour, Beaulieu, Rodriguez, and Ferrada-Videla's (2004) perspective, "a theoretical framework is a set of connections between different concepts that have been derived from a verifiable body of evidence in a particular body of knowledge". It is upon this basis that Davis's (1989) Technology Acceptance Model (TAM) and Rogers' Innovation Diffusion Theory (IDT) were used as the theoretical framework for this investigation on "Online

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teaching by Social Studies tutors in selected colleges of education in Ghana during the COVID-19 pandemic era".

The Technology Acceptance Model (TAM), proposed by Davis in 1989, according to Silva (2015), is an information systems model that explains how users come to accept the use of technology in their work processes. The model proposes that when users of a technology are presented with an innovative technology, several issues influence their verdict on how and when to use it. Hence, it becomes necessary for the would-be user of the new technology to ask the 'what', 'how', 'why', and 'when' questions about the technology they intend to use (Silva, 2015).

The 'what' question of technology integration into lessons by teachers emanates from the teacher's inquiry about the type of technology to use that would facilitate instruction transmission at a given period (Silva, 2015). Silva's assertion enables the user of that technology to assess the type of technology to use for a given lesson, with the capacity to fulfil the demands of set objectives, thereby meriting a certain level of satisfaction. In the era of COVID-19, when limited physical interaction and social distancing in instruction were recommended, teachers had no other option but to select a more feasible instructional technology that they perceived as easy to use in virtual and distance online instruction to sustain academic work. Various media options, such as Zoom video conferencing, radio, and television broadcasting, readily come to mind when they are accessible to the teacher and learners from different geographical locations, especially those that utilise internet technology.

The 'how' questions from Silva's perspective also inquire how and how the technology is applied in a given situation. Therefore, a teacher needs to think carefully about the topic of the discipline and what needs to be done. Therefore, the

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processes involved in integrating the technology into instruction must be understood by the teacher to ensure the smooth facilitation of the instruction. In a crisis like COVID-19, the teacher who uses LMS for the first time without prior knowledge of the technological tool would determine how it could be employed in the instructional situation. Therefore, how that technological tool would be used is crucial in online and virtual instruction. Thus, as Davis (1989) indicated, users' perceptions of the usefulness of the technology and the ease of use are likely to be formed once users have familiarised themselves with the structures founded on their preceding IT skills and understandings of utilising the system. Davis avers further that some unfamiliar peripheral variables, such as previous knowledge, skills, and experience, would unavoidably contribute to the acuity of users in terms of the expediency of technology and how easy it is for them to use, as well as the level of complexity of the technological capabilities. This conception by Davis is a prerequisite for technology adoption in a creative process.

Furthermore, Silva (2015) emphasises that the 'why' question of technology usage helps to meet many of life's endeavours, including communication, in terms of the purpose of its usage. In this instance, the educational requirement for remote learning during school closures due to COVID-19 necessitates the use of technology to bridge the gap created in instructional delivery by the pandemic. Silva reiterated that the 'when' question concerned when technology became beneficial. In a practical sense, technology helps humanity meet the needs of the time.

A cognitively prepared and informed user of a given technology can adapt to it when executing a given task. Therefore, an inference can be drawn from the technology acceptance model proposed by Davis. This model states that as individuals become

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informed of a technology's usefulness and perceived ease of use after considering the external variables, the chances of adaptation in its utilisation are greater.

The Technology Acceptance Model (TAM), theorised by Davis (1989), proposes that when users observe that a type of technology is beneficial and also easy to use, they will be eager to adopt it in the activities they intend to do. Therefore, as users recognise that the work processes will be easy to undertake, the greater the possibility of their adoption and adaptation to innovative technology becomes valuable (Dillon & Morris, 1996), as cited in Ajibade (2018).

Many researchers have cited the Technology Acceptance Model (TAM) due to its simplicity and applicability (King & He, 2006). The TAM model was based on the theory of reasoned action (TRA), which posits that social behaviour is stirred by an individual's attitude intended to predict information system use (Lin, 2007). King and He (2006) also argue that one of the primary reasons for the widespread acceptance of TAM is that the model is simple and easy to comprehend, as users attempt to incorporate it into a productive process, as illustrated in Figure 1. In the context of this investigation, Davis's (1989) TAM was applied to the "online instruction by Social Studies tutors at selected colleges of education in Ghana during the COVID-19 pandemic era". It investigated how computer technology facilitated instruction among tutors and teacher trainees during the COVID-19 pandemic, when face-to-face instruction was temporarily halted due to the contagious nature of the disease. In this regard, the inquiry examined the virtual teaching activities tutors used to support academic work. In the process, computer technology with internet access to technological tools such as LMS, Camtasia, Zoom, Skype, YouTube, Google Meet, and WhatsApp was perceived among some educators as applicable and easy to use, as

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online learning systems became the applied solution for delivering educational content, especially in emerging countries, at the beginning of the COVID-19 pandemic (Lee et al., 2020). Consequently, this study investigated whether there was a system (computer technology) to ease the burden of temporary school closures and achieve the objective of instructional sustenance in schools during the pandemic. This is diagrammatically illustrated in Figure 1.

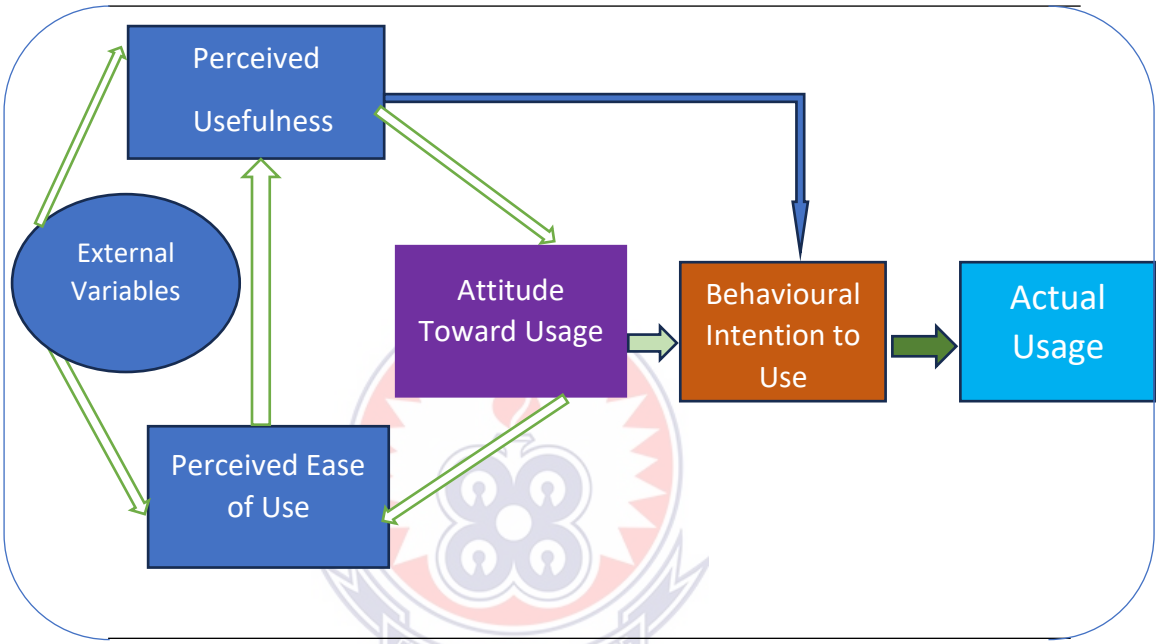

Figure 1: Technology Acceptance Model (TAM) By Davis (1989)

Source: Davis (1989) TAM

The adoption of TAM as a theoretical framework for this study also highlights its significant impact on technological innovations and their usage in teaching and learning processes. Consequently, in my opinion, my investigation into the "online teaching by Social Studies tutors in the selected colleges of education in the Ahafo, Bono, and Bono East Regions of Ghana during the COVID-19 pandemic" would have been incomplete without reference to Davies' (1989) Technology Acceptance Model. This model shows how computer technology can facilitate teaching and learning, especially in an emergency, through online instructional technology tools such as

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LMS, ZVC, Skype, YouTube Videos, WhatsApp Video Conferencing and Text Messaging.

Therefore, Haleem et al.'s (2022) conception that technology breaks down all educational barriers by permitting teachers and students to interconnect in real-time to teach and learn in ways that transcend time and geographical location is indeed an endorsement of Davis's TAM. They further insist that technology-based teaching and learning environments provide teachers and students with a unique atmosphere in which to teach and learn, even in challenging situations where traditional teaching and learning methods might have been impossible. This statement by Haleem et al. became particularly relevant to Davis's TAM and is true to this investigation during the COVID-19 pandemic, as the trajectories in online technology application in teaching and learning are well-defined by Davis's (1989) TAM. The strength of TAM has been confirmed by numerous studies, and the model has evolved to become the standard theoretical framework in thoughtful predictors of user intention toward the use of technology (Granić & Marangunić, 2019). In this instance, the enormous benefits of TAM in instructional delivery cannot be underestimated.

Furthermore, Sherman et al. (2021) postulate that because of the advancement of the internet, mobile phones, mobile apps, tablets, laptops, and other gadgets, and more aspects of the modern world are becoming digital and accessible, which is an endorsement of the importance of TAM put forward by Davis, which this study also endorsed in the course of its investigations. A case in point is that whilst many educational systems buoyed with ICT have become widespread in Western countries such as the United States of America, online instruction remains at an infancy stage in many emerging nations (Cakır & Solak, 2015). Ghana, for that matter, is no

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exception. This situation explains why "online teaching by Social Studies tutors at selected colleges of education in Ghana during the COVID-19 pandemic" was paramount to this study. Therefore, teachers can utilise technology to create a more dynamic and engaging instructional environment (Wang, 2020), which aligns well with this study. Hence, this investigation aims to ascertain how online Social Studies conducted by teaching tutors can sustain instruction during the COVID-19 pandemic in the selected colleges in Ghana involved in the study. This assertion by Wang resonates with Davis's TAM, where he stated that the perceived ease of use as a strong prognosticator of the perceived usefulness is strongly determined by the attitude of the user. Prasolova-Forland and Divitini endorsed Davis's conception. (2002) when they stated that new digital instruments in an instructional environment necessitate management and training. Therefore, teachers must be productive in the classroom and online, using a variety of technological platforms (Prasolova-Forland & Divitini, 2002). According to teachers, the internet and other digital technologies have greatly expanded the number of topics and abilities they must be knowledgeable about, and over half believe their workload has grown as a result (Tamal, Sarker, Islam & Hossam, 2022). Invariably, the perceived usefulness and ease of use, as noted by Davis's TAM, were dictated by teachers' attitudes towards using the technology in question to facilitate instruction.

2.1.2 Rogers's (2003) Innovation Diffusion Theory (IDT)

It has become a notable phenomenon that education and upbringing are constantly changing (Poplavskyi, 2021). In recent times, innovative technological solutions have been implemented in modern higher education institutions (Poplavskyi, 2021). It is interesting to note that innovation is the defining aspect of development (Schrum, Shelley & Miller, 2008; Goesthoek, 2013).

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The educational process is based on the exploitation and transfer of technology, which involves the movement of technology using specific information transfer channels from its individual or collective data medium to another (Glavas & Schuster, 2020; Liu et al., 2010). Unsurprisingly, the COVID-19 pandemic has added more impetus to the use of technology in transmitting knowledge from teachers to students in tertiary institutions, with Ghana being no exception. Research has shown that Rogers' diffusion of innovations theory is one of the most widely used for investigating technology adoption in higher education and educational environments (Medlin, 2001; Parisot, 1995).

For this qualitative study, Rogers's (2003) Innovation Diffusion Theory (IDT) has been simplified and presented in Figure 2.

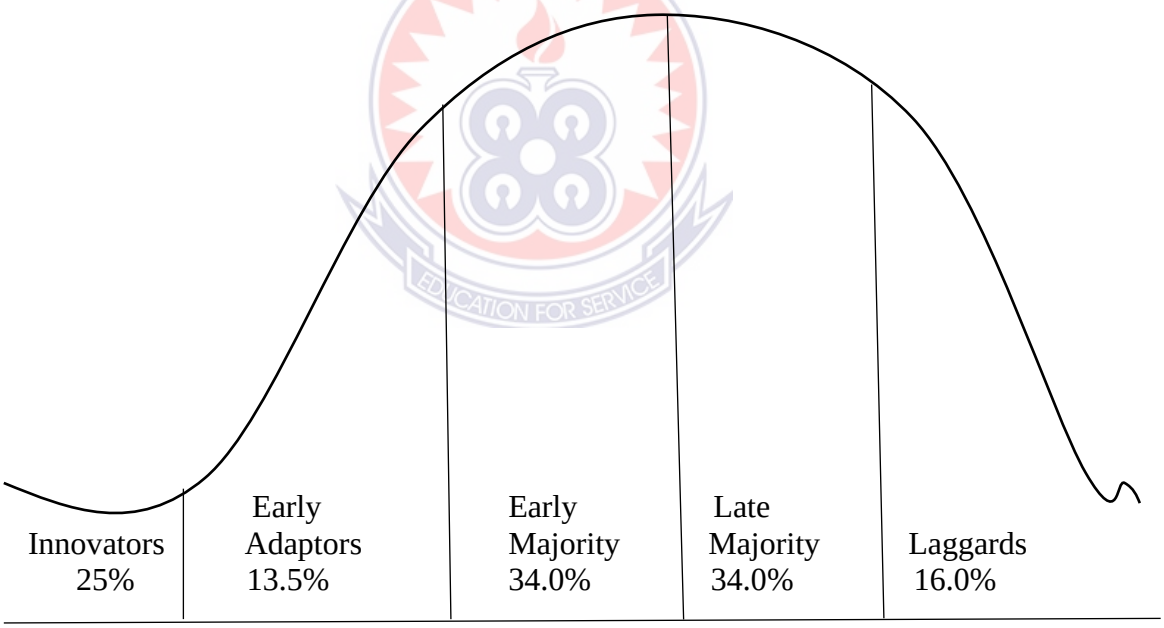

Figure 2: Rogers Innovation Diffusion Theory (IDT) of 1989.

Source: Rogers (2003) IDT

Rogers (2003) avows that in an innovation diffusion process, the first group of people to be encountered are the innovators who churn the technological product into being. He said they constitute 25% of the people involved in the innovation diffusion course

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and that without them, no technological invention can initiate and occur in reality. Following closely are the early adopters who see the need to try the technology to see if it is essential to their course. These groups of people, according to Rogers, constitute 13.5% of the total number of those involved in the diffusion route. Then comes 34% of a group called the late adopters, who might have had information about the new technology in question regarding its usage and how it could help the course of their activities, and hence also adopt it in the process. The traditionalists and the last in the chain of users of technological innovation are referred to as the "laggards" by Rogers, as they are "localities" that are late or non-adopters, often isolated from the other categories of adopters (Rogers, 2003). They constitute 16.0% of the people in the innovation diffusion chain. Hence, they linger or lag because the innovation they finally adopted might have already become obsolete. Unfortunately, many teachers worldwide have access to instructional technology innovations. However, at the time, they have almost become obsolete and are gradually giving way to other advanced versions used in tutorials.

However, Rogers outlined five main attributes of innovation that must manifest if the rate of adaptation is to improve. These attributes are (i) relative advantage, (ii) compatibility, (iii) complexity, (iv) trialability, and (v) observability. Rogers (2003) stated that "individuals' perceptions of these characteristics predict the rate of adoption of innovations" (p. 219). He adds that, aside from innovation-decision types (optional, collective, or authority), systems of social influence (norms or network interconnectedness), channels of communication (mass media or interpersonal channels), and agents of change may increase the predictability of the rate of innovation adoption. For instance, personal and optional innovations are usually adopted more quickly than innovations involving an organisational or collective

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decision. This explains why many innovation users, such as teachers and other private individuals, typically gain access to smart devices long before their institutions do, due to their perceived usefulness and ease of use for that individual. Nevertheless, Rogers insists that the strongest predictor of the adoption rate of an innovation emanates from the comparative benefit of such adaptation. Therefore, tutors' urge and rate of adoption of that innovative device in instruction may also be influenced by the supposed benefits of their adaptation.

Rogers (2003) again described the rate of adoption as "the relative speed with which members of a social system adopt an innovation" (p. 221). The rate of adoption of an innovation can be measured by the number of individuals who accepted it within a specified period. Consequently, the supposed characteristics of an innovation are important prognosticators of the degree of adoption.

"Relative advantage" was defined by Rogers (2003) as "the degree to which the innovation is perceived as better than the idea it supersedes. The extent to which an innovation is more productive, efficient, less expensive, or improves in some other manner compared to existing practice is considered adoption. One can argue that, in a way, innovators, early adopters, and the early majority are motivated by their status in terms of innovation adoption, unlike the late majority and laggards, who view the status as something of little or no significance. As such, teachers will be motivated to use technology when they realise its usefulness (McKenzie, 2001; Parisot, 1995). It is essential to support teachers directly or indirectly, encouraging them to adopt innovative practices in their teaching.

Compatibility also plays a significant role in the diffusion of innovation processes. According to Rogers (2003), "compatibility is the degree to which an innovation is

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perceived as consistent with the existing values, past experiences, and needs of potential adopters" (p. 15). McKenzie (2001) shared the view that the absence of compatibility between information technology and an individual's needs may adversely affect that individual's information technology usage. McKenzie's concern about incompatibility is crucial to technology adaptation in instruction by instructors at any given time to overcome any possible uncertainty in the adaptation process. According to Hoerup (2001), each innovation impacts teachers' thoughts, principles, ideals, and interpretations about teaching. Hence, there is bound to be a decrease in uncertainty if an innovation matches the needs of an individual well, which may result in a decrease in uncertainty, and the rate of adoption of the innovation will increase. There is a given innovation with the potential of usage must be clear and meaningful in terms of its name and identity.

Consequently, Rogers (2003) relates complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use" (p. 15). As Rogers mentioned, complexity is negatively correlated with the rate of adoption, which may be directly opposite to the other attributes, so complexity in excess impedes the adoption of a technological innovation. Faculty members may be challenged, borrowing Parisot's (1995) words to vary their teaching methods and infuse the intended innovation into their teaching. It is advised that complexity must have different levels, such that the successful adoption of innovation to deliver course content may arise from the user-friendliness of the hardware and software components.

Lastly, Rogers (2003) conceives observability characteristic in innovation adoption as "the degree to which the results of an innovation are visible to others" (p. 16). The

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modelling of the faculty's instruction for cohort remark is a vital impetus in the adoption and diffusion of technology (Parisot, 1995). Hence, successful adaptation to an innovative technology depends on the trialability, compatibility, and observability of its trajectories of operation while in an instructional setting.

Given all these relative benefits faculty is liable to obtain in innovation diffusion and adaptation processes in instruction, this investigation on "online teaching by Social Studies tutors at selected colleges of education in Ghana during the COVID-19 pandemic era" recognised Rogers' (2003) IDT and Davis's (1989) TAM, as well as other theories and related concepts that share the aspirations of TAM and IDT, as worthy theoretical frameworks.

Incidentally, technological innovations play a significant role in research work involving diffusion. So, from the viewpoint of Rogers (2003), typically, the words "technology" and "innovation" are used synonymously. To Rogers, "a technology is a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome" (p. 13). As Rogers explained further, technology constitutes the hardware and software components. Relatively, whilst hardware is "the tool that embodies the technology in the form of a material or physical object," software is "the information base for the tool" (Rogers, 2003, p. 259). Therefore, the primary concern of this investigation was the adoption of online teaching by tutors to achieve instructional outcomes during the pandemic.

Rogers (2003) further avers that since software (as a technological innovation) has a low level of observability; its adoption rate is relatively slow. So, from Rogers's (2003) standpoint, technology adoption means "full use of an innovation as the best

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course of action available", and rejection is a decision of "inability to adopt an innovation" (Rogers, 2003, p. 177).

Rogers also defined diffusion as "the process in which an innovation is communicated through certain channels over time among the members of a social system". This implies that an innovation may have been invented long ago, but if individuals perceive it as new, then it may still be an innovation for them. Therefore, the issue of "newness" in adopting an innovation is synonymous with knowledge, persuasion, and the decision to reject or use the innovative technology identified (Rogers, 2003). So, the knowledge about how to use the innovation identified, and the possibility of getting convinced about the usefulness of the innovative concept, is most likely to persuade the would-be user to adopt it.

Juxtaposing the trajectories here to the instructional situation in a teaching environment, teachers are likely to be persuaded to integrate a novelty idea (virtual online instruction) if they possess knowledge in the manipulation of the innovative software packages (Zoom Video Conferencing (ZVC), LMS, Skype, WhatsApp facilities, e-mail, and Telegram), and admit that it will help the cause of their instructional delivery at a "time", they may be persuaded to utilise it in their instructional processes (Sahin, 2006). The " time " issue, from Rogers' perspective, is a tool of strong significance but has often been neglected by behavioural researchers. He posits that the time dimension encapsulates the innovation-diffusion process, adopter categorisation, and the adoption rate in that defined space where the innovation diffusion occurred. In this regard, the COVID-19 pandemic spelt out a possible peak period in the innovation-diffusion process, adapter categorisation, and the adoption rate for educational purposes of distance virtual tuition online in the

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respective countries around the globe. Rogers likewise postulated that to reduce the uncertainty of rejecting or adopting an innovation; potential users should know the benefits and disbenefits of utilising the technology.

Rogers (2003) again highlighted communication channels as a component of the diffusion of innovations process. Rogers sees communication as "a process in which participants create and share information to reach a mutual understanding" (p. 5). According to Rogers, "the point of relay of the information either from an institution or individual was referred to as "a source", and how a message gets from the source to the receiver as a channel" (p. 204). By implication, Rogers insists that a specific kind of communication that includes these elements: an innovation, two individuals or other units of adoption, and a communication channel is a case of diffusion. Relatively, ZVC, LMS, Skype, WhatsApp Video Conferencing (WVC), and WhatsApp Text Messaging (WTM) mediums and tools are all within the definition Rogers gave.

Further assessment of interpersonal communication in a local or cosmopolitan (between individuals and outside sources) communication channel to Rogers's conception brings into the idea of seeing diffusion as a two-way communication between two or more individuals. Therefore, the process of dissemination of instruction to the learner as initiated by the teacher through any of the associated technological mediums is crafted as a diffusion process where two or more social beings (teacher and learners) consent to the relay and receiving of information at a given time to achieve an educational end either in an emergency or ordinary heterophily process through the mediums mentioned earlier on. "As a distinctive problem in the diffusion of innovations, participants are usually heterophilous"

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(Rogers, 2003, p. 19), a clear case of virtual online Zoom video conferencing between teachers and their students.

The innovation-decision process was described by Rogers (2003) as "an information-seeking and information-processing activity, where an individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation" (p. 72). Therefore, the individual tries to choose to adopt or reject the innovation. So, whereas adoption refers to "full use of an innovation as the best course of action available," rejection portrays "inability to adopt an innovation" (Rogers, 2003, p. 177). In addition, he stressed that if innovation is partially tried, it usually gets adopted more quickly since most people first want to try the novelty idea in their situation and then come to an adoption decision. So, educational facilitators would often want to get the opportunity to practice instructional technology with the capacity to ease the workload and facilitate instructional processes before resolving to employ it on a higher platform as the situation applies to computer and projector in PowerPoint presentation in a face-to-face instruction, and gradually linked-up via ZVC in a virtual instructional atmosphere on the internet. Ultimately, the teacher could adopt the innovation in similar situations during instruction. He theorised five main stages, which follow each other very closely: (i) knowledge, (ii) persuasion, (iii) decision, (iv) implementation, and (v) confirmation.

In sum, Davis's (1989) TAM and Rogers's (2003) IDT, among other supporting concepts, constitute the Theoretical framework for the investigation of "online teaching by Social Studies tutors at selected colleges of education in Ghana during the COVID-19 pandemic era" because of the innovative ideas the models offer teachers to sustain and improve their instructional delivery.

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2.1.3 Relevance of the theoretical framework to the study

The TAM and the IDT, the related concepts, their definitions, and other scholarly works that were heavily relied on are of much germaneness for this study. The insight and understanding of the theories and concepts used in this study exemplified the spirit of the knowledge base explored. In congruence, the significance of the TAM and the IDT models to the study emanates from the following dictums:

Firstly, the TAM and the IDTs used as the theoretical framework of this study allow the researcher to draw the study's boundaries by clearly indicating the domain within which the study was carried out. These boundaries are colleges of education within the former Bono, Bono East, and Ahafo Regions (SACE, BCE, ACE, AFCE., and SJCE) of Ghana, respectively.

Essentially, the definition of these bounds permitted the study to be carried out within the ambience of the research problem identified. This red flag was raised regarding the limits to generalisation by identifying primary variables that inspire a related event of interest and how these occurrences might differ or appear similar under different environments. Denzin and Lincoln's (2005) argument is that theoretical perspectives drive research goals, questions, methods, and findings, are linked to a researcher's paradigm, and endorse the earlier assertion. Therefore, the TAM and IDT models used for this study restrict any unrelated elements of no significance to the study from influencing its course. Hence, the study remained within the dicta that set the path to its objectives.

Secondly, researchers beginning a study may hold a "tentative theory" (Maxwell, 2005, p. 33) grounded in personal experiences or concepts from academic literature of the investigation phenomena. Based on this assumption, this study's TAM and IDT

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models challenge and extend the existing knowledge. This stems from the fact that the existing knowledge in past data can be re-tested to find out if it can stand the test of time. Therefore, grounded theory, for instance, is a popular methodology for generating theory through constant comparison and testing of emergent theories with data (Strauss & Corbin, 1994). By so doing, some aspects of this study may be endorsed or refuted depending on the prevailing circumstances under which the related study is conducted. In this regard, the TAM and the IDT models used for this study may help extend the knowledge base.

Moreover, the TAM and the IDT framework have helped connect this study to the knowledge about the problem of limited utilisation of online tuition before the advent of the COVID-19 pandemic. However, the COVID-19 pandemic exposed the low utilisation of online technology in instruction in many educational establishments before the COVID-19 pandemic. This conception agrees with Maxwell (2005, p. 33), who stipulates that researchers beginning a study may hold a "tentative theory" grounded in personal experiences or concepts from academic literature on the phenomena of investigation. So, to a large extent, the TAM and IDT theories and concepts serving as a benchmark for this study helped formulate the problem and select the research methods utilised in the problem investigated.

The TAM and the IDT framework also introduce and describe the theory, explaining why the research problem studied existed during the period. In like-manner, Merriam (2002) opined that this systematic structure of concepts used to explain or predict a particular phenomenon guides researchers in thinking about the phenomenon studied and the choice of methodologies. Therefore, the theoretical frameworks enabled the researcher to uncover how the tutors addressed the instructional processes in the

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colleges of education during the COVID-19 pandemic the way they did. This enabled them to make available informed options as to why and how the problem appeared as they were and the probable way(s) by which that problem was altered to arrive at a meaningful conclusion.

In addition, the theoretical models used for this study gave the basis for the choice of research methods since they ushers some directives by which the study was appropriately carried out. As further indicated by Merriam (2002), a theoretical framework composed of a systematic structure of concepts to explain or predict a particular phenomenon guides researchers in thinking about the phenomenon studied and the choice of methodologies. Evidence of how the TAM and the IDTs reviewed were carried out successfully by selecting suitable methods primarily manifests how problems can be approached by replicating the processes indicated in this study.

As an explicit statement of theoretical assumption, the TAM and the IDT theoretical framework this study adopted allows other researchers to diagnostically and analytically assess and appraise it. Relatively, Caelli et al. (2003) posit that positionality statements in qualitative research foreground this non-neutral nature of knowledge development when researchers question how their identity shaped awareness, interpretations, and evaluations of the research approach or phenomenon investigated. Since these statements are theoretical assumptions, so to speak, interested researchers and critics may decide to make inputs regarding specific directions or conclusions that the TAM and the IDT models aided this study to arrive at. Relatively, a pluralist stance acknowledges that we must live with complexity and uncertainty and that diverse forms of knowledge and ways of knowing are situated within specific contexts (Andreotti et al., 2011). These appraisal processes helped to

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enrich the knowledge base of the problem studied in particular and the Social Studies discipline within which this knowledge is situated broadly. Hence, complex and comprehensive conceptual insights of features that cannot easily be pinned down, including why the tutors and the students interacted the way they did in their instructional processes during the COVID-19 pandemic. Consequently, it behoved the study to address the question of "why" and "how" instruction during the COVID-19 pandemic appeared the way it did by enabling the researcher to transition from describing these phenomena observed to conducting instruction amid the COVID-19 spectacle. In sum, these TAM and IDTs helped the researcher to put together the observations made before and during the study into an orderly system.

Furthermore, the TAM and IDT models applied to the study made the research findings meaningful and interpretable. Within the realm of social science research where the study of human society and relationships is "inseparably connected to our minds with all the attendant subjectivity, emotions, and values" (Smith, 1983, p. 5, cited in Heng, 2020), the existing knowledge and assumptions established in the TAM, IDT models and other related concepts relied upon for this research, and the opportunity to have a more comprehensive analytical thought of the data obtained from the various interviews and focus group discussions conducted.

Additionally, the study's findings were explained and analysed well using the TAM and the IDTs. Scholars have also cautioned that the narrow adoption of paradigms in research can limit or skew understandings (Bodycott & Lai, 2012; Marginson et al., 2010; Stein, 2017). Given this, Heng (2020) assumed that the diversity of paradigms and positionalities in research should be valued as they allow other researchers to access multiple perspectives around the phenomena being researched. Hence,

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discussions of the findings of the study done in the context of the overall questions about the previous literature on TAM, IDT, and the related assumptions encouraged the researcher to meaningfully fashion out the interview and focus group discussion items through which data was assessed in the process of the research. Consequently, through these theories, the study was well-stimulated and well-directed as new knowledge emerged and its boundaries extended.

In summation, the TAM and IDT theories fulfil in usage sense within the social sciences by sustaining a key and fundamental objective to find an explanation for the kind of educational technology available and in use at the colleges of education in Ghana and how it is utilised. Credence is therefore given to the challenges associated with the TAM and IDT application in Social Studies, which is experienced through the teaching. However, little or no attempt is given to its explanation in our teaching and learning environment to enhance the utilisation of that knowledge and insight to influence decision-making in an informed and proactive manner to foster progress.

2.1.4 Application of the model to the study

Studies have proven that theory is usually used to explain certain societal conditions and events. Given this, it is identified as a collaboration between agreeing thoughts that have been developed over time, and through the process, a new assertion may be added to the new knowledge of studies that have already been laid claim to, to be deemed applicable and appropriate (Mngadi, 2018). In line with the assertion made by Mngadi, the theoretical models informed the background knowledge used to answer the research questions posed for the study. Consequently, the TA models, including Davis's TAM and Rogers's IDT, aided this study on how the previous

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literature established a relationship between the independent and dependent variables. In the process, the gaps identified coaxed the direction of the investigation.

The theoretical models used were fundamental in the processes of the investigation. It gave direction to the qualitative research method used, which subsequently aligned with the objectives and purpose of the study conducted. This enabled the study to progress within the defined limits. The size and scope of the investigation conducted about the TA model used equally aided in gathering optimal data sets for the study. Moreover, the choice of participants who represented the variables employed in the study was also informed by the TA models the study applied. Hence, the model facilitated the choice of sampled participants selected from the population for observation and the mode of data collection.

The study's model also necessitated the codes allotted to the participants. The subsequent method used to analyse this study was also informed by the TAM and IDT that the study used. The model further influenced the data analysis by the system of thoughts devised from the multiple concepts used in the study.

In sum, the research questions, consideration given to methodological posture, development of data collection, analysis, interpretation processes, totality in terms of the definition, and purpose this study sought to achieve were pivoted around the TAM and IDT that characterise this study.

2.2 Conceptual Framework

The research paradigm, which describes how the researcher's idea on the research problem was explored, is based on the view that utilising modern instructional technology contributes to the success of the instruction and curriculum re-

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conceptualization. Indeed, this study revolves centrally around the conception that the tutors at the selected colleges of education were confronted with the problem of how to sustain instruction amid the COVID-19 pandemic at a time when basic schools and tertiary educational institutions have temporarily been closed down. The transmissible nature of the disease made it impossible for traditional in-person instruction to be conducted by the teacher. Hence, the need for possible ways to be instituted to sustain academic work became very urgent. This contention emerged from the need for a supporting technological medium to facilitate instruction by Social Studies tutors.

Computer technology, through the use of online instructional tools, became a very viable option to pursue. Consequently, tutors can reconceptualise the innovative trajectories in their instructional processes, which may help them to operationalise the innovational concepts in instruction. At the zone of proximal development, to concretise decision-making in technological Adaptations, can assess the outcome of the innovation used in the previous instructional process and decide whether to adapt to it or reject it in future instructional engagements. Eventually, the introspection that follows the use of innovative concepts in the information transmission process will impact future instructions, rather than merely recalling their usage.

Therefore, this conceptual framework on technology utilisation in Social Studies instruction, as illustrated in a cyclical representation in Figure 3, asserts that instructional technology usage is not a linear process but a cyclical, recurrent set of processes that work together continuously to achieve a common goal. Hence, the Social Studies teacher's attitude towards knowledge transmission from the on-set of the task to the point of reflection on the outcome of the problem conceived after the

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technology has been incorporated into the process would be one that engenders and inspires confidence as new technological knowledge of the processes of instruction is acquired, integrated and consolidated through online distance tuition which was necessitated by the occurrence of COVID-19 pandemic.

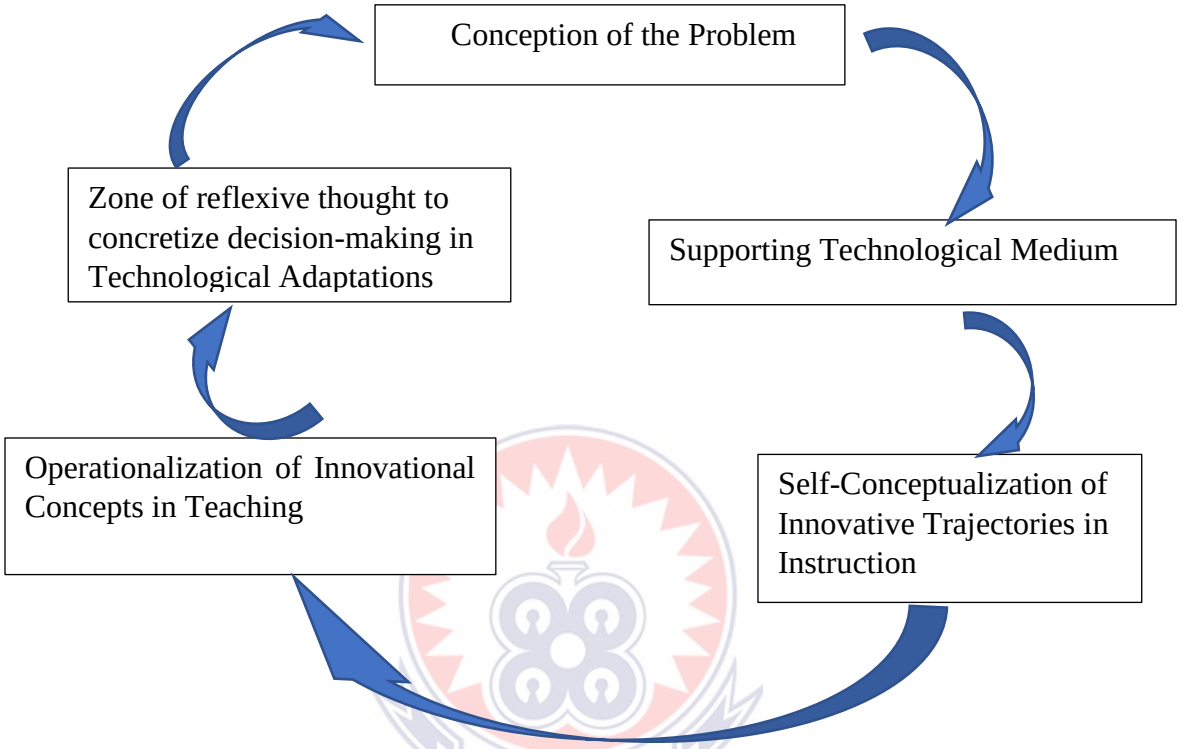

Figure 3: Cyclical Technology-Assisted Instruction

Source: Researcher Post Fieldwork (2021).

In sum, the discourse relating to this study's conceptual framework has provided insight and links to Davis's (1989) TAM and Rogers's (2003) IDT. Researchers encourage teachers to incorporate instructional foundations into their lessons, as the case may be in Social Studies education. The enormous benefits make the model very captivating to employ in instructional processes. Although some bottlenecks exist, such as unreliable power supply, poor internet accessibility, and inaccessibility to technological gadgets and incompatible tools in certain instances, it holds many prospects for instructional delivery.

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2.3 Tutors' Inconsistencies in using Instructional Technology

Before the outbreak of COVID-19, the literature on educational technology suggested that one of the key paths to impactful teaching of Social Studies is the use of educational technology in instruction and learning. Unsurprisingly, Holmes's (2020) writing on "Sustaining Learning Communities through and Beyond COVID-19" revealed that educational technology responses to crises can change schools' meanings, purposes, and values. The argument, however, was that for such technological tools to make the expected impact, they ought to be used appropriately and deliberately (Shah, 2021). Further studies also show that technology can be employed in various ways to aid Social Studies instruction. Studies further indicate that, prior to the advent of computers, several other forms of technology, including film, radio, and television, had been introduced into the classroom with varying degrees of success. It was not until the introduction of computers that computer technology, the internet, and other online tools became an area of interest in academia (Holmes, 2020).

Consequently, the technology used in instruction during the COVID-19 pandemic, as discussed in sections 2.3.1 and 2.3.2, played a central role in this review.

2.3.1. Online instruction and virtual classroom interventions

Online teaching and virtual classroom engagements were among the instructional technologies that many educational institutions were expected to rely on to facilitate instruction during the COVID-19 pandemic's transitional periods. Sangrà et al. (2012, p.152) referred to online instruction as; "an approach to teaching and learning, representing all or part of the educational model applied, that is based on the use of electronic media and devices as tools for improving access to training,

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communication, and interaction that facilitates the adoption of new ways of understanding and developing instruction". Sharma and Kitchens (2004) defined online instructional sessions as the application of web-based training equipment, such as virtual universities and classrooms, that permit digital collaboration and technology-assisted distance instruction. Online instruction enables the transmission of instructional activities. One can conveniently say that for online teaching and learning to be efficient, the facilitator and students must have good internet service and adequate, electronically compatible devices. A continuous indulgence in adaptation practices, as recommended by Davis's TAM and Rogers's IDT, will be necessary to practicalise the perceived usefulness of a given technology and its ease of use in the actual sense.

According to Gyampoh et al. (2020), in response to the COVID-19 emergency, the National Council for Tertiary Education (NCTE), in collaboration with Transforming Teacher Education and Learning (T-TEL) in Ghana, established a Virtual Teaching Taskforce (VTT) for Teacher Education. Gyampoh et al. (2020), as cited in Salifu and Todd (2020), subsequently maintained that the task force included all five mentoring universities, key stakeholders such as the Principals' Conference (PRINCOF), College of Education tutors, and non-teaching staff, as well as student teachers (through their respective unions). According to Salifu and Todd, the task force meets regularly to ensure that teacher education continues through virtual and online teaching and learning until institutions can reopen for in-person interaction. This healthy interaction and the steps taken allowed colleges of education to continue to operate by delivering teacher education to students nationwide, even in the wake of COVID-19. According to Higley (2018), online instructional environments differ from traditional classroom learning opportunities. Virtual distance teaching has taken much of

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teachers' attention in their resolve to transmit knowledge. Online instruction provides additional teaching experiences that allow teachers to interact, collaborate, and take ownership of their instruction (Listyani, 2021). Cooperative work has also changed in its form. It cannot be done directly anymore, as the COVID-19 pandemic has prevented it, and instructors and students must meet virtually for interaction in instructional classes. According to Lisyani (2021), this online collaboration fosters an atmosphere or habit of knowledge sharing. He stresses further that with the help of collaborative instruction, teachers advise students to work in a team through which their social skills could be developed. This explains the significant surge in online education since the COVID-19 pandemic (Li & Lalani, 2020). Zoom video conferencing online facility, for instance, ended the second quarter of 2020 with more than 370,000 customers, representing a stunning year-over-year growth rate of 45.8% (Tenebruso, 2020). In this unprecedented and uncertain time, people are encouraged to work from home while businesses and organisations adapt to the new normal (Nah & Siau, 2020). Therefore, Daniels's (2020) submission that educational organisations should increase the opportunities for distance education through digital resources and use them in organising asynchronous learning is tenable. These authors' assessment indicates how online services and patronage gained impetus as one of the most reliable sources of communication, particularly in educational provision.

Colleges of Education (CoEs) in Ghana's case were not different, as most CoEs have been conducting some level of emergency remote teaching using social media platforms such as WhatsApp and Telegram during the COVID-19 crisis, according to Gyampoh et al. (2020). CoE, in this regard, left no stone unturned in utilising other technological interventions to offset the absence of in-person instruction during the

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pandemic in many parts of Ghana and other parts of the world, as studies had earlier indicated.

Chapell (2020) stated in her study of how online instruction and virtual learning were conducted at the University of California, USA, by indicating that multiple teams in the Office of Information Technology (OIT) spun into action to support the faculty's transition to teaching in a virtual environment as the COVID-19 pandemic sprang up. According to her, these OIT groups anticipated needs for examination administration, lecture capture, and class discussions. Subsequently, they responded by acquiring new and expanded tools, developing training resources, and increasing support capacity. All these, she stated, were done to facilitate instruction as COVID-19 emerged without any obstruction when she reiterated that in a turbulent transitional time for instructors, Online Information Technology (OIT) has consistently provided outstanding service for continuing effective course facilitation. Moreover, she indicated that OIT staff secured 1,250 laptops for students and employees and made classroom space available to provide Zoom licenses and support, which in turn helped the facilitator move his course remotely with minimal disruption. The educational technology employed in the COVID-19 transitional era facilitates higher learning instruction and evolves to ensure flexibility in the instructional process. A wider range of online topics, along with opportunities to enhance their education by enrolling in courses that may not be available in their respective schools, can be made accessible to them through pedagogical adaptations for online and virtual instruction.

Hernandez (2021), in his contribution to a study on "Teaching Online in the Age of COVID-19," avows that, fortunately, the development of the internet and the expansion of online teaching since the early 2000s have produced a wealth of

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pedagogical research that can help us adapt to this new reality and change our approaches to better suit this medium. It can be inferred that his observation was strategically in tune with the ever-changing face of pedagogy in instructional delivery, especially at higher learning institutions. The skills employed in instructional delivery usually play a principal role in achieving a set objective (Knolton, 2014). Therefore, a facilitator's capacity in pedagogy and how that skill is applied in an instructional setting can significantly influence the feedback from students, especially in an era of emergency where instructional activities are largely virtual (Lalani & Li, 2020). In the wake of all these, the issue of unreliable connectivity in virtual instruction is often a characteristic of such situations.

Furthermore, from the perspective of Judson (2006), faculty can utilise a variety of digital tools to measure the level of progress of their students. His additional presumption suggests that an instructional setting is commonplace for discovering college teachers who utilise technology for various purposes, including interacting with students remotely on academic work, record-keeping, accessing lesson plans, creating study guides, and communicating with parents. In many of these instances, according to Judson (2006), teachers and students receive simultaneous feedback on the work done, where the internet facility is activated in each lesson. This situation helps, in one way or another, to relieve both teachers and students of the stress and tension that are usually associated with the conduct of a conventional system of instant exercises and class tests.

Otero, Peressini, and Ford. (2005) maintains that faculty need to understand why, when, and how to use technology in instruction, especially on how technology "should be used for a content-specific, pedagogical purpose(s)" (p. 12) to be

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persuaded to integrate new technologies in instruction. Otero et al.'s assumption aligns well with the view shared by Rogers (2003) that why, when, and how technology usage is a legitimate inquiry towards the efficient utilisation of a perceived technology. The inference that could be drawn from these assertions is that foreknowledge about using a given innovation determines the adaptability rate to its usage. Therefore, it is essential to ask the 'when, how, and why' questions about a particular technology before its implementation.

Concerning "the intensity of usage of instructional technology in schools", Ghavifekr et al. (2012) indicated that restricted access to resources and inadequate technical support were among the reasons lecturers cannot incorporate technological tools frequently in their teaching process. Tiba and Condy (2021) also put forward that the inability to provide universities and educational institutions in the first and second cycles with the required number of computers and accessories and to update school teachers with the requisite knowledge and skills was the leading cause of the failure in the implementation of computer application in educational institutions. However, some studies indicate that even when faculty possess the required expertise in ICT and have access to ICT resources, they remain reluctant to utilise them during instruction (Tiba & Condy, 2021). This situation suggests that other, more thoughtful and uninformed concerns may also exist that need to be addressed.

Conscious efforts are necessary to utilise technological tools regularly to facilitate instruction, particularly in emergency situations.

2.3.2 Motives for the application of instructional technology

The need to keep pace with society and prepare students for their roles in society are just two of the several reasons to use technology in education. Educators and

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researchers highlight the potential of technology to enhance the motivation and engagement of teachers and learners by catering to their individual styles and improving instructional outcomes (Eady & Lockyer, 2013). These processes have an equal tendency and potential to improve the delivery skills of Social Studies teachers at the CoE, one of whose immediate motives in an instructional environment is to devise possible means of aiding students in finding solutions to some of the instructional and contemporary problems confronting them.

The literature review highlighted that one of the primary motivations for teachers' use of technology in their instruction stems from the COVID-19 pandemic. Again, the reviewed literature shows that instructional innovation aids teachers in using valuable educational practices, integrating computer technology tools to cater to students' needs (Klein, 2005; Eady & Lockyer, 2013). They declared that the idea of incorporating technology into the curriculum arose from a concern that tutors may have been teaching about using technology but not addressing how students can apply technology-related knowledge and skills. They stated further that to address this problem, there was a move to integrate technology into each key instructional area to help students overcome this obstacle.

The important role that technology plays in teacher education, in the motivation of teachers technically depends on computer self-efficiency (Al-Azawei et al., 2017; Cakır & Solak, 2015; Cheung & Vogel, 2013; Yeou, 2016), learner experience (Liu et al., 2010; Ros et al., 2015), learning styles (Al-Azawei et al., 2017), technical support (Cheung & Vogel, 2013; Sánchez & Hueros, 2010), perceived convenience (Chang et al., 2012), subjective norm, (Song & Kong., 2017), and cultural factors (Sang et al., 2010). These motivational factors align with Salifu and Todd (2020),

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who indicated that these probable motivational features in TA allow teachers to design meaningful learning experiences that embed technology. Salifu and Todd further mentioned that these are not new areas for teachers; they have always considered the best tools and resources to support instruction. However, advances and accessibility of technologies have made the possibilities seem almost endless.

It is important for teachers not to use technology for its sake but rather to embed technology appropriately (Eady & Lockyer, 2013). Here, teachers draw upon their expertise and experience in what to teach and how to teach it. A teacher has many considerations and influences in designing learning experiences for students, and the appropriate use of technology and its acceptance due to its usefulness, as postulated by TAM, are but some of those considerations. Just as teachers keep up to date with curriculum developments, new educational policies, and advances in the art and science of teaching practice, they keep up to date with the technological tools that are available to them (Eady & Lockyer, 2013). They reiterate that teachers use digital resources for a variety of purposes and in many ways, including:

- As a way to introduce students to a topic
- As part of a teacher's lecture or demonstration
- As a stimulus to group or whole-class discussion
- To provide students with access to different text types
- To engage students in activities that are not possible in the classroom
- To allow students to work independently as a review or extension activity.

To further buttress the view that several reasons account for the utilisation of instructional technologies in the cause of teaching, Yalcin et al. (2011), clarifying TA in education, stressed that lecturers use online instructional technologies in their

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lessons to allow pre-service teachers to be conversant with instructional technologies and learn how to apply them in their lessons. It is also noted that this situation can provide tutors with a better teaching platform by living one-on-one (Yalcin et al., 2011). They again opine that "college of education lecturers are models to pre-service teachers since they always re-model and imitate the lecturers". Consequently, college lecturers' use of technology in their lessons will be perfect, valid, advantageous, educative, and practical (Yalcin et al., 2011) to the teacher trainees learning to incorporate technology in their teaching. This assumption by Yalcin et al. is a clear pointer to TA, as theorised by Davis's TAM. What made this practice more crucial and essential in instructional delivery was the occurrence of the COVID-19 pandemic. It is hoped that even in the absence of COVID-19, teachers will make it a habit to infuse modern educational technology into their day-to-day lessons in school.

2.4 Technology in Pedagogy Competencies of Tutors

Technological competencies, according to Mishra and Koehler (2006), relate to one's ability to comprehend operating systems and computer hardware and the ability to use standard sets of software tools such as word processors, spreadsheets, browsers, and e-mail. How to install and remove peripheral devices, install and remove software programmes, and create and remove documents are all part and parcel of technological competencies from the perspective of Mishra and Koehler (2006). This conveniently explains why there is a need for the tutor to exhibit competencies in computer technology and their related components to be able to discharge their instructional duties that are technologically laden as expected of them.

Brandt (2001, p. 74) argues that "a technologically fluent person must be able to understand technology broadly enough to apply it to everyday usage and recognise

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when information technology can assist or impede in achieving a goal". Therefore, teacher education should demonstrate the latest technology and enable teachers to understand how technology can assist students in meeting the required curriculum standards (Okojie & Olinzock, 2006).

In harmony with Okojie and Olinzock (2006, p. 285), Means (2010) contends that "despite decades of national, state, and local promotion of educational uses of technology, instructional practice in most schools has changed a little from that of the mid-20th century". In reaction to the discourse above, Abromi et al. (2011) maintain that "although some schools have developed technology training for faculty, a comparative analysis of technology use in the classroom from 2003 to 2007 showed that technology use increased only from 17% to 22% with faculty as the primary impediment" notwithstanding the so much money allocated to education and technology.

According to Wetzel and Williams (2005, p. 45), cited in Knolton (2014), Arizona State University sought to understand why students who graduated from their programmes did not feel prepared to teach with technology. The reasons adduced were simply that they felt unprepared and that the "graduates had not seen exemplary modelling of using technology effectively by their faculty and did not find it useful when they entered the field."

These issues notwithstanding, Culp et al. (2005) also postulated that "teacher professional development has been one of the enduring themes over the past twenty years (20yrs) and is often highlighted in these reports as the single most important step towards the infusion of technology into education". It is pretty disheartening that many of the beneficiaries of these professional development programmes, by and

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large, feel very reluctant to infuse technology into their teaching activities as expected.

Effective teaching in educational settings worldwide depends mainly on the teacher's competency level in the chosen field and their familiarity with the tools and technology at their disposal (ACARA, 2011). They maintain that competence in information communication technology is realised as one of the general capabilities in the Australian Curriculum. So, effective implementation of the curricula can be made possible if the implementers are abreast with the contemporary technological trends and are prepared to make the necessary adjustments to suit the demands of the day to enhance teaching lessons.

From the viewpoint of Schmidt et al. (2009), technological content competencies are how technology can create new representations for specific content. In this case, some technologies can be applied or implemented into certain subject content and not all of the subject content. The academic staff needs to know the subject content and consider that it can be changed when applying technological knowledge in teaching and learning (Chai et al., 2010). This suggests that all content in the Social Studies curriculum can be effectively applied to a given technological model, making the lesson more comprehensive. Hence, the teacher's ability to contextually explain a given concept and suppositions in an instructional setting interwoven with technologies comprehensively is the issue in contention here.

In the era of COVID-19, traditional face-to-face class activity was not much encouraged due to the health implications for both the teacher and the learner. As a result, much attention was given to technology incorporation in a virtual class environment. Arguably, the COVID-19 pandemic necessitated in greater proportions

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the need to review teachers worldwide' technological content competencies to meet the changing circumstances of information transmission (Lisyani, 2021). This "wake-up" call has changed the face of teaching in many instances.

The equally important benchmark that requires consideration is "Pedagogy". Subsequent studies show that pedagogical processes are evolving to meet the changing demands of the digital world, as online instruction has necessitated an update (Alaghbary, 2021). This "new thinking" in instructional delivery brought about by the COVID-19 pandemic dictates that members of academia reorient their instructional delivery methods to meet the constantly changing processes. Orlando and Attard (2016) stated that a shift in pedagogy is inevitable as a "one-size-fits-all" approach will not work out in online sessions, although this thinking was envisaged. The support system in the area of lecture theatre infrastructure, accommodation for teachers, and reliable and consistent internet connectivity in this implementation process is very vital since it determines the success or failure of online instruction, aside from the inevitable and prerequisite skill set needed to facilitate instruction (Alaghbary, 2021). However, incorporating these characteristics with technology in the era of COVID-19 continues to remain the missing puzzle in many instances among faculty in academia. Unfortunately, technological processes have not been isolative of current instructional dispensation in one way or another. It is worth noting that the many improved and innovative forms of educational innovations emerging in information processing and transmission are the core issues that inspire further investigation by researchers in this field.

Technological pedagogical knowledge is also about knowledge of various technologies used in instructional settings. This might consider the knowledge and

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understanding of various technological tools for performing a specific instructional task (Mishra & Koehler, 2006; 2008). Teachers should acquire the knowledge, attitude, and skills required to effectively integrate information and communication technologies into their teaching processes (Şad et al., 2015). It is justifiable for teachers to acquire these competencies to ensure efficiency in instructional delivery buoyed by innovation.

Faculty may have pedagogical and content knowledge but lack the technological expertise required for productive instructional presentation. This situation leaves the faculty with no option other than to resort to the traditional teaching and learning method, which may not conform to the demands of the COVID-19 pandemic in instructional delivery.

2.5 Bottlenecks in the Application of Instructional Technology

The utilisation of every innovation comes along with an attendant problem. Therefore, efforts must be made to address the emerging challenges, invest in technology for educational purposes, utilise qualified faculty members for this stage, and create facilities suitable for this purpose at higher institutions (Baliamoune-Lutz, 2003). In the meantime, the provision of educationally eligible and required technological tools, preparing and developing the skills of faculty, and provision of equipment entails a massive investment to be able to realise the expected goals of modern technology application in instruction continue to be some of the significant obstacles facing faculty (Al Njadat et al., 2021). Incontrovertibly, pedagogical and content knowledge, as studies have shown, are well possessed by faculty. Nonetheless, what is required to be well-mustered is technological knowledge. In this regard, faculty's ability to gain knowledge in the fundamentals of technology and the mechanisms of its use could go

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a long way in minimising wasted time during the instructional process (Talebian et al., 2014). However, it is still not common to see widespread adoption of technology within instruction by lecturers (Moser, 2007). A study by Otero et al. (2005) revealed that urging faculty to change instructional strategies that have worked in the past to approaches that integrate current technologies was challenging. Nevertheless, as Gobel et al. (2021) noted, the burden of adapting to the situation and ensuring high-quality teaching remained with the lecturers. As a result, these lecturers had to engage more deeply in using educational technology (Gobel et al., 2021). This was not a big hurdle for some, but it posed a new and overwhelming challenge for others. For the third group, it became a window of opportunity for pedagogical innovation and the development of personal technological skills (Gobel et al., 2021). Gobel et al.'s suggestion endorses the postulation made by Rogers (2003) on his innovation diffusion theory about how new technological and other advancements spread throughout societies and cultures, from introduction to widespread adoption. An incident of emergency involving human interaction may serve as a potential test case for innovations to spread within and among establishments. Therefore, the COVID-19 pandemic served as a test case for adopting new technologies in tutors' efforts to sustain academic work at Ghana's selected colleges of education. Although the last two decades have seen advances in online teaching at universities, conservative stances persist, as traditional lecturer-centred teaching is often viewed as "the gold standard for higher education" (Kehrwald & Parker, 2019).

In the wake of these observations, it is noteworthy that other equally pressing challenges, such as inadequate and deplorable classroom infrastructure and inadequate accommodations for tutors, also hinder the effective implementation of instructional technology during the COVID-19 pandemic. The increased demand for new

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synchronous and asynchronous online instructional environments has proven that existing infrastructure was exceptionally strained (Zhang, 2020). Hence, effective online instruction implementation requires up-to-date equipment that supports such activities with minimal or no hitches.

Furthermore, school administrations had to address problems related to the lockdown of tertiary institutions and the various members of these institutions who needed support (Gobel et al., 2021). This highlights the essence of making available to faculty the fundamental resources needed to sustain instruction amid COVID-19, without physical contact between teachers and learners.

Therefore, beyond the availability and quality of the teaching environment, lecturers' competencies in using the means to switch to online teaching and coping with the challenging situation were of crucial importance (Martin et al., 2020; Ritzhaupt et al., 2018; Kushner et al., 2013). Addressing this need through online training programmes, technology, and pedagogical workshops was essential for the faculty, considering other socio-economic challenges.

Indeed, several barriers, according to Ertmer and Ottenbreit-Leftwich (2010) and Otero et al. (2005), such as the time required to learn the technology, technical competence, low self-efficacy, and insufficient institutional support, prevent faculty from utilising them effectively and efficiently. Being able to create online platform accounts, install required software programmes, download and upload documents, use word processing software, navigate, and operate internet search engines, which are some of the educational programs online (Xie et al., 2020), may be beneficial to faculty in instruction. However, the minimum technological requirements, such as laptops, access to high-speed internet, availability of multifunctional digital devices,

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and professional software applications, as prescribed by Xie et al., are not readily available to the tutors and teacher-trainees in the CoE in Ghana.

China (2017), in a study, said that schools could not purchase high-speed internet, which made connectivity slow and, in some cases, no internet access because it was too expensive. These results suggest that unreliable networks discourage teachers from using technology, confirming what other researchers have observed (Handal et al., 2013). In other studies, it is apparent that schools have limited hardware and software programs and that the limited technology equipment was not maintained (Blackwell et al., 2014; El Semary, 2011; Hartman et al., 2019; Kafyulilo et al., 2016; Raman & Mohamed, 2013). Due to limited technological resources, learner-to-computer ratios were high, discouraging teachers from using technology (Chigona et al., 2010). Research conducted by Schrum et al. (2008) found that 92% of teachers in their sample lamented the lack of technological hardware and software programmes. As a result, many teachers reported that they purchased technological equipment using their funds (Tiba & Condy, 2021). Online instruction has become a permanent fixture; taking the CoE experience as a case in point, teachers are expected to utilise online facilities in many instances to facilitate instruction.

Teacher training is a significant venture because effective education and an effective education system are the most essential ways to influence the educational system (Kahraman, Demir, & Yalcin, 2008). As a result, many teacher educators and teacher education programmes have experimented with technology over the years. Despite their efforts, teachers continue to face challenges and concerns regarding their ability to effectively integrate technology into teaching activities (Oh & French, 2007). For instance, the successful implementation and application of computer technologies, the

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most widely used educational technology in instructional environments among academicians in public universities, have received a tremendous response (Latchem et al., 2005; Luck et al., 2010; Odabasi, 2000). Researchers investigating the uptake of computers by beginning and novice teachers frequently conclude that if teacher education programmes are to achieve their goals, a necessary component of the course is the provision of instructional models for computers to implement (Kurt, 2019; Diem, 1989; Haywood & Norman, 1988; Novak & Knowles, 1991). This explains why teacher education policy formulators in Ghana have made it possible to include ICT-related courses at the basic level and beyond in Ghana's education system.

In a related development in schools, Latchem et al. (2006) argue, in their contribution to this discourse, that faculty members require professional development, regardless of their circumstances. It is no surprise to see career and professional development programmes embarked upon by the Ministry of Education in collaboration with BODA since 2017 to equip faculty at teacher training colleges in Ghana with the changing trends in educational delivery. However, there were instances where teacher educators felt isolated due to a lack of development opportunities aligned to their needs (Hammett & Phillips, 2009; Knolton, 2014; Lundstrem, 2011; Newland, Mourlam, & Strouse, 2018). However, technological and related challenges often prevent the complete achievement of objectives at the end of the lesson at a given time, particularly during the COVID-19 pandemic.

As Donelly (2010) also pointed out, utilising online technologies has become an increasingly significant challenge in academic staff development within higher education institutions. Donelly (2010, p. 350) again opined, "It is important to seek best practices for combining instructional strategies in computer-mediated

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environments that take advantage of its strengths to avoid the weaknesses." In effect, the associated problem posed during the peak period of COVID-19 allowed for little to no face-to-face instructional interaction.

Although Kurt (2019), among other authors, did indicate that the 21st-century educational dispensation requires teachers to use some form of technology in their delivery in the face of technological inefficiencies, it is the responsibility of the Social Studies tutor to imbibe and imbue in the trainee-teachers the requisite knowledge and skills required to enable them to dispense their educational responsibilities and democratically participate as an active member of society with little or no difficulty. Subsequently, a 21st-century teacher's inability to incorporate technology in instruction concerns the educational fraternity. It must be dealt with in all seriousness, irrespective of the cost, accessibility, time, and geographical setting of trainee teachers.

Additionally, from the perspective of Chakraborty et al. (2021), teachers' steady access to digital technologies is a prerequisite for effective online instruction. Regarding the digital divide, Beaunoyer et al. (2020) assert that it existed prior to the COVID-19 outbreak, but the pandemic exacerbated it. Their submission is worthwhile, particularly as ICT has become the driving force behind modern instructional delivery and, more importantly, during the COVID-19 pandemic. Undoubtedly, online teaching may become an integral part of instructional delivery, as COVID-19 pandemic protocols were strictly implemented in many parts of the world during this investigation.

Equally, a significant challenge for implementing technology in an instructional environment is supervising technology-oriented pedagogical practices during the

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COVID-19 pandemic. According to Tesfaw and Hofman (2014), instructional supervision is the regulation carried out by the school headteacher, subject heads, and other assigned supervisors to guide and support teachers. This exercise is a crucial component of the teacher education curricula in Ghana. Zepeda (2010) views instructional supervision as the continuous observation and surveillance of instruction to promote professional practices and facilitate professional development in a collegial and collaborative manner. Zepeda states that instructional supervision occurs in two main ways: classroom observations (both formal and informal) and portfolio supervision. According to Holland (2005), formal observations occur when a school headteacher or any other administrator sits in the classroom to conduct lesson observations. Although the COVID-19 emergency temporarily restrained sit-in supervision, the pre-COVID-19 instructional environment had permitted such a supervision process. Indeed, such supervision begins with a pre-observation conference, where the supervisor meets with the teacher before the actual lesson observation, and ends with a post-observation conference.

The other, informal classroom observation occurs when the headteacher or another administrator briefly visits the class while the teacher is conducting a lesson. Such visits are intended not necessarily to evaluate the teacher but to gather information on the curriculum and the teacher's technological and pedagogical practices (Downey et al., 2004). These scheduled visits are designed to ensure the teacher's adequate preparation. They facilitate the effective presentation and general teaching process during a given session, including portfolio supervision. Portfolio supervision, from the perspective of Zepeda (2010), refers to the review of the teacher's artefacts, such as the teacher's statement of belief on teaching, sample lesson plans, results of tests, schemes of work, samples of student work, career goals, journals, and such things like

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lesson notes. These preparations, done by the tutor before instruction, enhance the application of technology and related practices.

As an exemplar of cutting-edge teaching methodologies, colleges of education were expected to spearhead the transition from traditional in-person teaching and learning to a virtual mode. Although in-person instruction was not possible at the time of this investigation, inquiry into supervision became crucial to determine how virtual instruction was monitored. Thus far, the review of assertions by scholars suggests that some challenges exist in the application and management of instructional technology.

2.6 Institutional Support in Aid of Technology Integration in Instruction

A look at the institutional support available to the faculty to enable them to live up to technology integration in instruction was sub-composed into four (4) categories in this investigation: 1. Institutional training and development programmes, 2. Institutional guidance offered to faculty, 3: institutional incentives, and 4. Institutional tools were available to faculty to facilitate the integration of technology into instruction.

2.6.1 Institutional training and programmes for capacity building

The institutional training and development support programmes look at the training programmes educational establishments have put in place to help equip faculty with the requisite innovations, pedagogical skills, and content updates to complement their efforts at gaining up-to-date technological expertise required to make their instructional delivery very exquisite for their trainee-teachers to emulate when they complete their respective courses. Jaipal-Jamani et al. (2018) indicated in their study on workshops for capacity building that

> taking on technology leadership roles as workshop facilitators is effective for building faculty capacity for technology-enhanced instruction. Faculty members pointed out that being invited to serve as

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> workshop leaders allowed them to take on a role they may not have otherwise considered. It made them take risks and expand their technology integration into instructional capabilities.

This revelation in the workshop was a clear manifestation of the essence of capacity building in enhancing the integration of technology into faculty instructional capacity. In essence, the Social Studies faculty's involvement in such workshops will help members sharpen their technology integration skills, which are essential for effectively performing their functions as technologically oriented teachers in the 21st-century instructional environment. In effect, workshops and capacity building among faculty in integrating technology into instruction are one area that is paramount to this investigation.

In a related issue, Lion and Stark (2010) noted in their study on how institutions support faculty in the design and development of web-based tuition that some institutions only offer technical training. In contrast, others offer faculty technological and pedagogical training. From the perspective of this investigation, such design and web-based training in support of faculty to deliver technologically oriented lessons in an emergency instructional environment becomes critical.

Lan (2014) suggests in his submission to the discourse that technology professional development for faculty should be perceived as beneficial to their professional practice and research needs, geared towards addressing the content delivery goals of their curricula. Harleem, Javaid, Qadri, and Suman. (2022) also emphasised that technologies can provide online in-service training. Lan (2014) and Harleem et al. (2022), although they examined the capacity building of teachers from two different perspectives, their respective submissions focused on practical ways to make on-the-job training regularly accessible to facilitators to improve their capacity. Therefore,

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one of the objectives of this investigation was also to explore the on-the-job training programme in place to ensure the achievement of this objective.

Subsequently, faculty members who are relatively technologically proficient may be allowed to mentor those who lack the requisite expertise, enabling them to meet expectations in terms of capacity to deliver (Lion & Stark, 2010). This instance further underscores the need for technologically oriented training programmes and workshops to equip faculty with more expertise and enable them to adapt to the constantly evolving instructional environment. Henceforth, the faculty's capacity is broadened and enhanced through periodic training and workshops.

Hence, technology professional development (PD), according to Jaipal-Jamani, Figg, Collier, Gallagher, Winters, and Ciampa (2015), should insist on the content to be taught rather than on mere identification of the technology, with emphasis on the interactions between technology, subject matter, and the associated pedagogical practices. It could be reiterated here that the faculty's acquisition of technological know-how is not merely for its own sake. However, this investigation is essential to their ability to effectively, productively, and purposefully interweave pedagogy and the subject matter during Social Studies instruction.

Fleagle (2012), Garett (2014), and Scott (2001) used mentoring in a technology-oriented capacity building for faculty. According to these authors, a meeting with faculty members and peers revealed the faculty's interest in technology integration into instructional sessions. In this regard, how well the concepts of "technology acceptance", "innovation diffusion", and integration were conceived by teachers in their lesson delivery played a pivotal role in this investigation on "online teaching in the period of the pandemic by tutors in some selected CoE in Ghana".

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A study conducted by Baran (2016) shows that students at a university in Turkey were mentored by faculty across various disciplines over a semester. Although the face-to-face mentoring option was fruitful in aiding lecturers to integrate technology into instruction, faculty realised that the PD could be further enhanced by "offering workshops, rewards, and hotline services for technology problems; reducing course loads; and increasing interaction with colleagues" (Baran, 2016, p. 63). Akin to Baran's support, authorities in Ghana's colleges of education generally offer capacity-building and professional development support to tutors in all disciplines simultaneously. The problem may arise from the over-concentration of attention on content and pedagogy, as little or no attention is paid to the technological expertise of tutors and their integration into instruction (Newland et al., 2018). Therefore, it was pertinent for this investigation to assess tutor capacity in integrating technology into instruction and how technological processes aligned with instructional sessions during the COVID-19 pandemic.

The literature further indicates that some institutions support faculty understanding of technology application in instruction. As a case in point, Ansyari (2015) employed a two-day workshop on innovation practice to enable faculty to comprehend the technology in an instructional context. The goal was to facilitate the design of instructional notes and specific technologies that can be conveniently applied in instructional sessions at a time. In such situations, faculty are exposed to specific contexts, from design to implementation and evaluation stages. This scenario presented to the Social Studies tutors may help assess which practice is more effective and beneficial to both the teacher and the student (Burke, 2012). Additionally, this allows tutors to replicate innovative concepts in different settings to achieve their instructional goals.

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From his perspective, Newland et al. (2018) view technology integration into lessons as a viable and more effective tool by which faculty in a given period can explore and utilise to help achieve a set objective. In Burke's (2012) view, the opportunities presented by technology integration workshops allow faculty to identify areas of interest where these technologies could facilitate the achievement of specific instructional objectives. The enormous benefits of integrating technology into instruction workshops for tutors cannot be underestimated and must, therefore, be encouraged at regular intervals.

2.6.2 Institutional tools made available to faculty to expedite work

"Institutional Tools" refers to the available resources to assist faculty in further implementing innovation-laden instruction (Lion & Stark, 2010). Accordingly, specific technological tools (including hardware and software applications associated with information literacy practices) are best used to instruct and guide students toward a better, more robust understanding of the subject matter (Kurt, 2019). Instructional modules and online references are also excellent sources of institutional tools that can be made available to faculty at any point in time to expedite instructional delivery.

Lion and Stark (2010) reiterated that a checklist form geared towards self-evaluation by the faculty could also be a valuable tool for guiding faculty members through the course development process. They indicated that the rationale for developing the checklist is to enable the development of processes based on available information, serving as a guiding document for the institution. This decision, in no small way, helps improve faculty members' technology competence. All these can be made possible through the support systems put at the doorstep of faculty and well utilised by them (Littlejohn, 2020).

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Taylor and McQuiggan (2008, pp. 65–67) also identified some of the support mechanisms found online that faculty desire, such as assistance with "converting course materials for online use" and "facilitating online discussion forums" as well as additional less formal and self-paced learning materials as an institutional tool that can to some extent ease work. These support systems can significantly impact the entire teaching and learning process if utilised efficiently.

The need for replication of what works is reiterated in the literature on technology in pedagogy. For instance, Kivunja (2013) and Kurt (2019). purports that teacher education faculty must model how technology-enhanced teaching is implemented in the basic schools for pre-service teachers. The Social Studies faculty at the colleges of education in Ghana requires something similar in their bid to transmit technologically laden instruction to trainee teachers. It is then the expectation of the faculty that the competencies they may acquire from various training programmes and workshops will ripple down to the trainee teacher and the basic school child, who will also become accustomed to technologically oriented problem solvers through the instructional models. As they proceed to senior high schools and beyond, technology is increasingly incorporated into their learning, making it familiar and accessible.

This mindset may positively set the tone for effective and productive instruction, benefiting learners, especially those in basic schools who are the beneficiaries of the consciously tailored training programmes at colleges of education used for this study.

2.6.3 Institutional incentives provided to facilitate instruction

This perspective examines the specific resolutions adopted by institutions to motivate faculty to adopt a more technologically oriented approach to lesson delivery, at the expense of the over-emphasised traditional mode of delivery. Strielkowski and Wang

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(2020) describe the fourth-generation teaching and learning space as the "online & digital university". Their statement is inferred from the point that students in this information age are more inclined to the internet and what it offers. Although COVID-19 prompted a sudden shift to online teaching and learning, it presented a considerable challenge to many lecturers and students (Gobel et al., 2021). Their assessment was based on the reality that face-to-face meetings between teachers and students during the COVID-19 pandemic were not discussed. Consequently, as an incentive, tertiary institutions worldwide responded with an emergency digitalisation of teaching, learning, and research (Bozkurt & Ramesh, 2020; Crawford et al., 2020). This initiative by the school authorities inspired confidence among tutors and students during the COVID-19 pandemic, resulting in the continuity of their academic programs with minimal disruption to their academic calendar. It, therefore, comes as no surprise when Lion and Stark (2010), in their study, revealed that "when specific tasks or initiatives rise to a threshold level of significance, incentives might emerge as ways to entice, encourage, or recognise and reward desired performance. While many often think of monetary incentives, non-monetary incentives are more common in higher education. Hence, recognition and increased opportunities to assist others (such as mentoring) offer simple and cost-effective ways that other institutions also choose to recognise their faculty's efforts (Lion & Stark, 2010). All these processes support the assumption that educational authorities have galvanised various incentives to ensure that academic work is not disrupted, even during the COVID-19 pandemic.

Lion and Stark (2010) stated that professional development funds should be set aside as a sponsorship package for those ready to undertake professional development to sharpen their information and communication skills, meeting the contemporary requirements of instructional delivery. As envisaged, a professional development fund

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is an incentive that most colleges of education in Ghana, if not all, have made available to faculty as a matter of urgency for capacity-building and career training programmes to relieve them of the financial burden associated with such engagements.

2.7 A Summary of the Literature Reviewed

The following is a summary of the literature highlighting the gaps that necessitated this research.

Contextually, the studies by Mamattah (2016), Chang, Hajiyev, and Su (2017), and Salloum (2019) were conducted in ordinary circumstances, differing meaningfully from the COVID-19 pandemic context where Social distancing measures were in place, online instruction was mandatory, and in-person instruction was postponed by Act 1012 of 2020 of Ghana. This contextual difference limits the applicability of their findings to the pandemic situation.

Secondly, the COVID-19 pandemic accelerated the adoption of innovative instructional delivery methods, driving academia from traditional to online learning, embracing digital platforms and tools to deliver instruction, and redefining instructional delivery modes by leveraging technology to enhance the learning experience. However, was this the situation in the CoE in the study, as indicated?

Thirdly, online instructional technology provides teachers and students with a unique environment for teaching and learning, even in challenging situations where traditional teaching and learning methods might have been impossible in emerging countries like Ghana, where online technology in instruction remains in its infancy. So, was it the case in the CoE in the study?

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Fourthly, the idea that College faculty need to know why, how, and when to use technology for content-specific pedagogical purposes was also presented as fertile ground for legitimate inquiry into the efficient utilisation of the perceived online technology in the instruction of the college tutors in the study.

Furthermore, capacity support was mentioned, but there was silence on the discipline and personnel to benefit, culminating in the declaration of empirical inadequacy in online technology in pedagogy in tertiary education, resulting in the non-indication of TK of Social Studies tutors in the CoE and the subsequent inconsistencies in the use of online instructional technology before the occurrence of COVID-19 pandemic. This suggests that a facilitator's capacity in online pedagogy influences students' feedback, and tutors must possess competencies in technology and content integration, as well as pedagogy. This void also necessitated the study.

Once again, the regular meetings engaged by the task force commissioned by the government of Ghana to ensure that teacher education continues through virtual and online teaching and learning until institutions can reopen for in-person interaction also gave impetus to the conduct of this research to ascertain if online instruction at the colleges of education during the COVID-19 pandemic took place as indicated.

There was the need for immediate motives to propel the tutors' use of online instructional technology in school, although the literature reviewed has shown that before the advent of the COVID-19 pandemic in Ghana, almost all teachers utilised one form or another of digital communication media for their social interactions within and outside of their formal teaching.

Moreover, the tutors of the colleges of education did not specify the subject discipline used to redesign the online technology instruction for teacher-trainees.

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There was a lack of insight into technology in pedagogy competencies on specific technologies or concepts, indicating a knowledge gap, insufficient proficiency in using digital tools or software, and resistance to adopting new technologies or methods, which also portray skill and adoption gaps, respectively.

The literature also highlights challenges in unreliable networks, discouraging teachers from utilising online technology, as well as limited hardware and software programs, and inadequate technology equipment. So, was this situation the case in the CoE in the study?"

Lastly, the reviewed literature shows that tertiary institutions, including the Co, have inadequate access to technological tools, faculty development, and poor equipment and infrastructure. The question, therefore, was whether all these institutional support systems were lacking in the CoE. Hence, the investigation aimed to fill these voids as well.

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CHAPTER THREE

METHODOLOGY

3.0 Introduction

This thesis chapter outlines the discourse on the adoption of technology and innovation in work processes, as well as the associated challenges. It identifies the research paradigm, the philosophical underpinnings of the study, the research approach, the research design, and the research setting. It again informs the population used for the study, the sample and sampling procedure, instruments for data collection, trustworthiness, data collection procedure, data analysis, and ethical considerations of the research.

3.1 Research Paradigm

The interpretivist paradigm was the research paradigm the study adopted. The interpretivist paradigm was adopted to collect appropriate data for scholarly research and direct the research process. Again, the interpretivist paradigm provided a convenient framework for assessing the research problem and generating solutions. Thus, the interpretivist paradigm serves as a model for this study, guiding a well-structured, efficient research process. It enabled the description and interpretation of data to understand how online instructional technology was utilised by the Social Studies tutors at the selected colleges of education in Ghana as a tool to sustain distance instruction during the COVID-19 pandemic. As an interpretive study, the participants could express their subjective views.

3.2 Philosophical Underpinnings to the Study

The study is grounded in an interpretive paradigm, prioritising meaning-making and qualitative methodologies to understand the research phenomenon.

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The philosophical underpinning, by implication, means that the research design and methodology adopted logically follow the philosophical assumptions, which makes the findings acceptable and reliable. Moreover, the interpretive paradigm was employed in this study because it enables an in-depth exploration of meanings and experiences, providing rich insights into the study's findings. It also acknowledges the subjective nature of reality and the importance of context, enabling a nuanced understanding of the participants' perspectives and experiences. Therefore, by adopting an interpretive stance, this study revealed the intricacies of online instructional technology during the COVID-19 pandemic and ultimately contributed to a deeper understanding of it.

In this investigation, a phenomenological study was employed to explore the tutors' lived experiences with technology in their instruction at selected colleges of education in Ghana during the COVID-19 pandemic, with the aim of sustaining academic work. Consequently, observation, interviews, focus group discussions, and other supporting literature were relied upon for data presentation, analysis, and discussion.

The choice of phenomenological study as a qualitative research method for this investigation was necessitated by the desire to give an account of how innovative concepts helped tutors at the colleges of education sustain their instruction in the face of the pandemic. This qualitative research approach helped minimise bias and error in the study to the greatest extent possible. The presentation of findings depicts the exact data participants provided, which were analysed deductively from pre-determined codes developed as strictly organisational tools.

It also helped the study produce rich, detailed, and valid process data based on the participants' perspectives rather than my own. Data acquired from the participants in a

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qualitative study is manifest in text. As such, the exact data was analysed, and conclusions based on the frequency of responses were drawn to validate the primary data produced from the source.

The qualitative approach employed in the study facilitated the development of concepts that provided clarity to the phenomenon naturally observed in the experimental settings, emphasising the meanings, experiences, and standpoints of all the participants studied. Hence, the qualitative techniques, such as observation, in-depth interviews, and FGD, used in the study provided a description and understanding of the participants' behaviour in using technology in instruction at the colleges of education in the investigation. This outcome provided insight into what it feels like to be in someone else's position and to come to terms with and comprehend the world as another person experiences it, particularly in the context of online instruction during the COVID-19 pandemic at the colleges involved in the study.

3.3 Research Approach

The choice of a phenomenological study as a qualitative research approach for this investigation was necessitated by the desire to provide an account of how innovative concepts helped tutors at the CoE sustain their instruction in the face of the pandemic. Therefore, taking a cue from Creswell and Poth (2017), the data were interpreted and analysed inductively to gain insight into the processes the tutors adopted during the COVID-19 pandemic school closure to sustain academic work at the selected CoE in Ghana.

As Osugwu (2020) puts it, the choice of research approach is informed by the idea that the goal of analysing qualitative data for the process is to account for or describe

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the variation in the societal phenomenon being studied over time. The reasons for the use of a qualitative research approach for the study are as follows;

The approach helped reduce bias and error in the study to a bare minimum. The findings depict the exact data that participants provided, which are analysed deductively from predetermined codes developed as strictly organisational tools.

It also helps the study to produce rich, detailed, and valid process data based on the participants rather than my perspectives and interpretations. Data acquired from the participants in a qualitative study is manifested in the text. As such, the exact data are analysed, and conclusions based on the frequency of responses are drawn to validate the primary data produced from the source.

The qualitative approach used in the study facilitated the development of concepts that clarified the phenomenon studied naturally in the experimental settings, allowing me to emphasise the meanings, experiences, and standpoints of all the participants I studied.

The qualitative techniques, such as observation, in-depth interviews, and FGD, used in the study provided a description and understanding of the participant's behaviour in using technology in instruction at the CoE in the investigation. This investigation helped me gain insight into what it feels like to be in someone else's position and to understand the world as another person experiences it.

3.4 Research Design

Existential phenomenology, which focuses on understanding the smaller audience's experiences on the nature of things through their positions, is the research design used in this study (Hugh, 2023). It depicts the processes involved in the investigation from

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the beginning to the end by giving direction on how data was collected and analysed throughout the study.

Therefore, this research employed a qualitative approach to gain an in-depth understanding of online instruction by Social Studies tutors at selected Colleges of Education in Ghana during the COVID-19 pandemic era. Hence, this study is rooted in an interpretivist paradigm, crediting meaning-making and the subjective interpretation of data. Also, using purposive sampling, participants were selected from the population based on their relevance to the study and ability to provide detailed insights as demanded by the research questions. The study made use of a sample size of 35 participants. Field notes were taken during observation by surrogate observers who were at the point of relay of instruction to observe how online instruction was carried out by the tutors to capture additional data and provide context.

Consequently, data was analysed thematically with the aid of pseudonyms inductively. Trustworthiness and ethical considerations were also taken care of during the study. This research design provided a framework for conducting this qualitative interpretivist research by guaranteeing that the study is rigorous and trustworthy, provides rich insights into the research conducted, and confines it to the goals and purpose it intended to achieve.

3.5 Research Setting

According to Wells (2022), a research setting is the environment where a study into a given phenomenon is carried out. In the context of this thesis, the study's setting considers the physical environment, the geographical location, and the number of colleges involved in the study. So, the investigation occurred at five selected education colleges in Ghana's academic environment.

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Firstly, the physical environment where the study was carried out was an academic setting where prospective teachers who are meant to take up appointments at the basic level of the Ghanaian educational system were given official training. It offered the researcher the opportunity to explore some of the processes involved in the preparation and training of the prospective teachers in their bid to get themselves well-equipped to be integrated into the teaching fraternity as professionals endowed with the requisite know-how in the technology incorporation into instruction, methods, techniques, strategies, and skills to deliver their mandate as expected of them.

Secondly, the exact geographical location for the study is the five purposively selected colleges of education, namely the Berekum College of Education (BCE), Saint Ambrose College of Education (SACE), Atebubu College of Education (ACE), Al Farouk College of Education (AFCE), and Saint Joseph College of Education (SJCE) at the former Brong Ahafo Region (Bono, Bono East, and Ahafo Regions) respectively. The selection of these institutions helped facilitate the study's entire conduct and organisation. These schools selected comprise those supposedly endowed technologically (SJCE and BCE) relative to those not endowed technologically. The essence was to find out how the two categories of schools could fare in the delivery of instruction in their circumstances during the pandemic.

Moreover, the College Principals, Social Studies tutors, and trainee teachers offering Social Studies as their area of specialisation, who constituted the study's population, shared unique characteristics that made their composition very consistent. Consequently, their responses aided in achieving the objectives set for the study.

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Last but not least, although the respective colleges of education were temporarily closed down at the time of the study due to the COVID-19 pandemic, which disrupted instructional sessions, not many problems were encountered in collecting the primary data.

Overall, the setting for qualitative research provides the lenses through which the study and its methodological approaches, thoughts, findings, conclusions, and recommendations were observed.

3.6 Population of the Study

The target population for the study was obtained from the five public Colleges of Education in the former Brong Ahafo Region (Bono Region (SACE, BCE), Bono East Region (ACE, AFCE), and Ahafo Region (SJCE)) of Ghana, respectively. Hence, the principals, all Social Studies Tutors, and all Level 100 and Level 200 Social Studies trainee-teachers of the CoE were the targeted population for the study. Table 1 is the representation of the target and accessible population:

Table 1: The representation of the target and accessible population

Target Population (2,249)	Accessible Population (35)
All L100 and L200 Social Studies students of the selected colleges (2,214)	Critical Case Purposive Sampling L100 and L200 Social Studies students of the selected Colleges (20)
All Social Studies tutors of the Colleges in the study (30)	Critical Case Purposive Sampling Social Studies tutors of the selected colleges (10)
All Principals of the selected colleges (5)	Purposively Sampled Principals of the selected colleges (5)

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3.7 Sample and Sampling Procedure

According to Creswell and Poth (2017, p.142), a sample is a subgroup of the targeted population that the researcher plans to study to generalise the target population. Singh (2019) adds that a sample is a group participating in a study or an investigation. This implies that a participant in a study is part of the sample. Hence, the sample selection was based on the following inclusion criteria. Firstly, the Level 300 and 400 students were supposed to engage in practice teaching to gain hands-on experience and an off-campus practicum, followed by a reflection on their practicum experience. So, the Level 100 and 200 students often engage in thorough coursework. Consequently, these participants were selected from these groups (Level 100 and 200 students), and the College Principals (CP) possess perspectives in terms of diverse backgrounds that are directly relevant to the research questions. Proficiency in the English language and the participant's willingness to be part of the study when contacted played a role in their inclusion in the sample.

From the point of view of Singh (2019), the sampling procedure refers to the set of laws and measures by which some elements of the population are included in the sample. Consequently, the targeted population was defined (the CP, Social Studies Level 100 and 200 trainee-teachers), respectively, since their characteristics, as previously indicated, are very relevant to the study. Hence, the potential participants were identified based on who would be able to provide valuable insights into the research phenomenon. Subsequently, the critical case purposive sampling suggested by Singh, a non-probabilistic sampling technique, was adopted for the study. The participants were invited to be part of the study through their contacts in the repository of their respective schools. Furthermore, the sample size of 35 participants was determined by data saturation, as no new information emerged from additional

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participants. I ensured the sampling frame was relevant to the research questions and objectives. The inclusion and exclusion criteria also ensured that participants were relevant to the study. Last but not least, as a key consideration, room was made to adjust the sampling strategy based on the emerging findings.

In sum, I ensured that this qualitative study's sampling procedure was rigorous and practical by resorting to these steps and considering the key factors stated3.

Table 2: Distribution of Sampled Participants in the Study

College of Edn	P (No/%)	S.S Tutors (No/%)	S.S. Tra. Trs (No/%)	Total
St Joseph	01	02	04	07
St Ambrose	01	02	04	07
Atebubu	01	02	04	07
Berekum	01	02	04	07
Al Farouk	01	02	04	07
Total	**05**	**10**	**20**	**35**

3.8 Instruments for Data Collection

Research instruments are measurement tools designed to obtain data from research subjects on a topic of interest (Hinds, 2020). This explains why, from the viewpoint of Curry (2023), lesson observation, interview, and focus group discussion (FGD) are the most preferred qualitative data collection instruments. According to Curry's thought, this study utilised an observation guide, an interview guide, and a focus group discussion guide to collect the primary data. These qualitative data collection processes facilitated the analysis of the data textually and exhaustively.

In effect, the two main data sources utilised in this study, as identified by Stewart (2022), are primary and secondary. The primary source refers to the basic data source

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used for the analysis in Chapter 4 of the study. These sources concern observations, interviews, and focus group discussions (FGD) between the researcher and the study participants.

The secondary materials collected for the study relate to any other sources of reference that the researcher was not directly involved in in the generation and presentation of findings of the study but finds them very useful and related to it. Through this process, evidence of lacuna was drawn for the study. These reference areas include the various textbooks on the study topic, scholarly articles and papers from journal publications, and some magazine editorials. These were most preferably relied upon for the literature review. Google Scholar, ERIC, Sage, and Emerald databases on the internet were equally relied upon as secondary sources of data identified for reviewing the literature for the study.

3.9 Data Collection Procedure

Conducting research in the pandemic era meant adhering strictly to COVID-19 protocols. As a result, very minimal contact with participants was made. Ravitch and Carl (2020) recommended the following data collection procedure: scheduled observation of practical teaching and learning activities, and two-part interviews, i) demographic characteristics, and ii) thematic areas emanating from the research questions, prior to notifying participants of the interviews via email and WhatsApp communication. So, the processes adopted were as follows;

3.9.1 Interviews

A semi-structured interview was used to collect data for the study. The interview was used to acquire data from the principals and the tutors of the colleges in the study. The interview started at the SJC on Thursday, 8th April 2021, and ended at ACE on Friday,

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30th April 2021. The other three colleges had their respective dates scheduled between the two colleges, which began and ended the study. It took three weeks to conduct all the interviews at the colleges in the study. Of the 35 participants in the study, 5 principals and 10 tutors were interviewed. The interview items were grouped into two parts. The first part addressed the participants' demographic characteristics, which included their identity and the duration of their college attendance. The second part also covers the four major sections dealing with the four main themes of the study. For convenience and preparedness of research participants, interview guides were sent through WhatsApp and e-mail technology, respectively, to participants two (2) weeks before the scheduled interview days (Ary et al., 2002). Through Zoom, Skype, WhatsApp Video Conferencing, WhatsApp Text Messaging, and e-mail technologies, the sampled principals, tutors, and student participants in the study were interviewed, and their responses were recorded, transcribed, subsequently analysed, and discussed.

The researcher initiated the interview sessions using an interview guide to ensure thorough coverage of all the details that needed to be addressed in the study under the following major themes; a). Instructional technology tutors employed during the COVID-19 pandemic. b). Tutors perception of learners' reaction on their online technology in pedagogy. c). Challenges tutors face in the employment of instructional technology and d) Available institutional support. The interview guides were adhered to, but as a qualitative study, the inner thoughts of the research participants were duly relied on (Fowler, 2002). So, I asked probing and follow-up questions where necessary to ensure clarification, confirmation, and in-depth data collection, as indicated in Appendix "B".

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3.9.2 Focus Group Discussion

Focus group discussion is where people get a researched demographic to meet to discuss and share ideas (Busayo, 2023). He emphasised that it is a research method involving a structured conversation with a small number of participants who are similar to one another. FGD aims to learn about people's concerns, attitudes, and behaviours towards certain societal issues (Busayo, 2023). A study conducted by Busayo (2023) shows that focus group discussions help to comprehend and determine the range of individuals' thoughts and preferences, rather than inferring or generalizing the subjective issues being discussed.

Busayo (2023) identified six main FGD types: Two-way focus group, Dual Moderator focus group, Dueling moderator focus group, Respondent Moderator focus group, Mini focus group, and online focus group. The two-way focus group discussion is where one group watches while another group answers the questions posed by the moderator (Busayo, 2023). In a dual Moderator focus group, two moderators lead one focus group from different points of view. Busayo further indicated that two moderators lead one focus group with duelling moderator focus groups but disagree and present their two sides. One focus group member leads the discussion with the respondent moderator focus group while the moderator takes notes and observes members who can give input (Busayo, 2023). The Mini focus group, Busayo indicated, is a smaller version of a traditional focus group (typically up to 6 people), but fewer than 10 participants engage in sensitive or personal issues.

With online focus groups, participants are connected via video conferencing software and can be located anywhere. In an academic exercise like this research, the participants' responses are recorded, transcribed, and analysed to enable conclusions on the findings to be drawn. Therefore, synchronous online focus group discussion

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was used due to the advent of the COVID-19 pandemic, which offset in-person interaction with the participants.

Consequently, the literature reviewed also influenced this study's choice of data collection instruments. The literature shows that qualitative studies require data collection instruments that enable research participants to express their inner thoughts (Sharma & Srivastava, 2020). As a result, focus group discussion guides (one leaflet with interview items electronically sent to each of the sampled participants because they were not together in school at the time due to the COVID-19 pandemic) were used to guide the conduct of the FGD for the participants. Johanna, Avinash, and Bevoor (2023), in their study on "Small Group Discussion Method to Increase Learning Activity: Its Implementation in Education", suggested that a minimum of 3 and a maximum of 6 participants is ideal for a Focus Group Discussion (FGD). They further indicated that the goal for selecting a minimum of 3 or 4 participants is to create an environment where participants feel comfortable sharing their thoughts and opinions (Johanna et al., 2023). From this perspective, four participants from each college were considered ideal for the study. Consequently, the subgroups identified were selected from each sample using a "criterion" method where participants were selected based on their willingness to participate, language proficiency, diversity, intelligence, and gender.

The gender selection was dictated by the preponderance of males to females. Since male students constitute the majority of the population, three-fourths were selected, while one-fourth of the female students were selected. In all five sessions FGDs were conducted, with one session for the four participants from each of the selected colleges. Samples of the main issues discussed can be found on Appendix 'C'at pages

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202 and 203 . Different discussion dates were allocated for each college. SJCE had their session on the 12th, BCE on the 15th, SACE on the 20th, AFCE on the 22nd, and AC on the 27th (all in April 2021). Each session lasted between 45 and 60 minutes. To ensure adherence to COVID-19 protocols, the FGD was conducted synchronously via Zoom Video Conferencing, Skype, WhatsApp Video Conferencing, and Google Meet technologies. An electronic connection test was conducted a day before each discussion session.

As shown in Table 3, participants were assigned codes to facilitate analysis and discussion of the findings. Consequently, the codes given to the participants are defined in Appendix B.

Table 3: Codes given to Participants in the Study

College of Education	Category of Participants			
	CP	**CT**	**CS**	**UCES**
SJC	SJCP	SJCT-1	SJCS-1	
		SJCT-2	SJCS-2	
			SJCS-3	SJCUS
			SJCS-4	
SAC	SACP	SACT-1	SACS-1	
		SACT-2	SACS-2	
			SACS-3	SACUS
			SACS-4	
BC	BCP	BCT-1	BCS-1	
		BCT-2	BCS-2	
			BCS-3	BCUS
			BCS-4	
AFC	AFCP	AFCT-1	AFCS-1	
		AFCT-2	AFCS-2	
			AFCS-3	AFCUS
			AFCS-4	
AC	ACP	ACT-1	ACS-1	
		ACT-2	ACS-2	
			ACS-3	ACUS
			ACS-4	

Source: Author's Construct.

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3.9.3 Observation

To ensure data reliability and minimise data interference, the study employed data collection surrogates to observe lessons in the sampled Colleges of Education. As a tutor at one of the sampled Colleges of Education, observing online teaching of Social Studies lessons from the perspective of transmission by colleague teachers increased the likelihood of distorting data validity. As a result, an observation checklist was prepared to guide the investigator's triangulation observers (surrogate observers) selected in each of the sampled colleges of education. National Service Persons attached to the Department of Social Studies at the respective colleges of education were used for the investigator triangulation. They sat through the online teaching sessions from the point of transmission with the instructor to observe how online and virtual instruction was done. Before the observation, the surrogate observers were taken through the observation checklist to ensure they understood what to look for and how to record the relevant data. In all, ten (10) Zoom lessons were observed through investigator triangulation from the respective venues in the colleges. The surrogate observers are the national service personnel attached to the respective Social Studies departments in the colleges involved in the investigation. This was done to gain a better understanding of how instruction was conducted during the COVID-19 pandemic. More importantly, the research topic was qualitative and subjective, and therefore could not be examined numerically. Hence, there is a need to observe how the tutors undertake distance instruction from a chosen instructional environment synchronously. Each of the ten (10) sampled tutors performed one virtual and online lesson. Data from the observation was collected through note-taking of online lessons using the observation checklist on page 264 and 265 Appendix ‘C’.

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3.10 Data Analysis

This sub-component of the study's methodology involves data coding, theme generation, and analysis.

According to Bailey (2007), coding in qualitative analysis involves assigning labels, or words that connect to issues denoted by segments of the data, and organising the data in a manner that facilitates further analysis. Therefore, for a meaningful analysis of qualitative data in a study of this nature, it is essential to provide representations that allow participants to conceal their identities. In this instance, Tamplin (2023) identifies alphabetical, numerical, colour, decimal, mnemonics, and alphanumeric codes as some of the methods of codification used in qualitative research.

However, this study preferred mnemonic and alphanumeric codification for practical analysis. The mnemonic codification, a modified version of the alphabetical codification system, involves using alphabetical letters to create codes that aid memory (Tamplin, 2023). In this instance, the CP category of the participants was assigned mnemonic codes, such as "SJCP", to facilitate meaningful interpretation and analysis of their data. The mnemonic codes also made it easier to recall and reduced the possibility of errors. On the other hand, the alphanumeric codes, also known as the alphano-serial system or the combined code system, from the standpoint of Tamplin (2023), utilise alphabets in conjunction with numbers, such as "AFCS-1", to codify data in research. Therefore, the "CT" and "CS" participants were represented by alphanumeric codes to clarify the data analysis. Consequently, the confidentiality and anonymity of participants were also ensured throughout the process. Again, the coding systems used ensured the ease of understanding of the analysis. Additionally, duplication across codes was avoided in situations where each code was associated with a specific participant. Ambiguity and uncertainty were also eliminated in the

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study process as relatively minor codes were used at the expense of large codes commonly associated with errors.

From the perspective of Erlingsson and Brysiewicz (2017), themes are used to "express a fundamental meaning, i.e. dormant content, found in two or more categories." Based on the checklist, several themes were generated to guide data collection, significantly reducing extraneous data. Consequently, the four research questions and their related sub-questions were thematised for the purpose of analysing the results in Chapter Four of this study.

Studies indicate that data analysis is a cumbersome process. Marshall and Rossman (1999) describe data analysis as a messy, ambiguous, and time-consuming process, yet one that is also creative and fascinating. Through this process, a mass of collected data is organised, structured, and given meaning and in agreement with Marshall and Rossman, LeCompte and Schensul (2010) also mentioned that research data analysis is a process researchers use to reduce data to a story and interpret it to derive insights. Adopting a qualitative data analysis procedure helps reduce a large chunk of data into much smaller fragments. This investigation utilised themes (from the research questions) and alpha-numeric codes (for participants) to aid in conducting and analysing the interviews and focus group discussions. Finally, a summary and conclusions were drawn, and recommendations were made to bring the study to a close.

Furthermore, this stage unearths the nuances in raw data collected to elicit both overt and obscured information, which can be used to either corroborate, advance, or dispute ideas empirically (Babbie et al., 2007). Therefore, this stage facilitated decisions on the meanings and implications of words, images, and figures, as well as

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their relationship to the issues under study (Denscombe, 2000). The data analysed in this study was qualitative because it involved non-numerical and unstructured data emanating from sources such as Zoom video conferencing and open-ended interview responses.

Grounded theory, a method of analysing qualitative data, suggests that data analysis should begin by formulating a theory around a single data case (Bhattacherjee, 2012). Therefore, the theory is *grounded* in actual data. Then, additional cases can be examined to determine if they are relevant and can be incorporated into the original theory. This method was not relevant to this study.

Framework analysis is also a qualitative data analysis method. This was, however, not selected for this study because although some coding was done in this study, the themes did not follow any hierarchical pattern as demanded by a framework analysis.

According to Prasad (2008), narrative analysis is also a qualitative data analysis method, where some qualitative data, such as interviews or field notes, may contain a story. Hence, the process of choosing a product, using it, evaluating its quality, and deciding whether to buy it again next time, depending on the outcome of the initial trial, as postulated by Rogers (2003), aligns with Prasad's earlier submission. In certain circumstances, elements of this investigation align with the description of this method of analysis.

Discourse analysis is another qualitative data analysis method. It refers to analysing what people say in social and cultural contexts or semiotic events. It is beneficial when a study focuses on building or strengthening a brand (Long, 2004a). This study's theoretical brands, "Technology acceptance" (online instruction) and "innovation diffusion" (online teaching), were investigated for their contribution to

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sustainable teaching practices in the event of the COVID-19 pandemic. Therefore, discourse analysis was deemed highly useful for this investigation.

Equally, from the standpoint of Prasad (2008), Content Analysis as a data analysis technique is efficient for text data, such as that found in transcribed interviews, observational data, and textual literature assembled for this investigation of TA in Social Studies instruction during the COVID-19 pandemic. Prasad adds that this analysis is the "study of content concerning meanings, contexts, and intentions contained in messages". For instance, identifying an innovative concept and incorporating it into a work process to sustain an activity that could have otherwise been impossible to execute requires an effective analysis method for such an investigation. In this investigation, the focus was on incorporating technology into instruction. Therefore, going by Davis's (1989) TAM and Rogers's (2003) IDT, both authors focus on an individual's ability to accept or reject a given product by considering the external variables, perceived usefulness, and perceived ease of use of the product. Given this, the investigation into the application of technology in instruction, where individual tutors decide to accept or reject online teaching, partly depends on the underlying issues that Prasad, Davis, and Rogers emphasised. Thus, this method is suitable for this investigation because the features of the data analysed were relevant to this investigation, since the focus was on the content of the data.

Content, narrative, and Discourse methods of qualitative analysis were selected to analyse the textual content derived from observations, transcribed interviews, and relevant literature to the investigation (Stone, 1966; Kerlinger, 1973; Prasad, 2008).

In congruence, discourse and content analysis are the most preferred qualitative methods for this investigation due to their relative benefits.

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3.11 Trustworthiness of Data

The sound, adequate, and accurate methodological processes affirm the study's trustworthiness. In support of this view held by the researcher of this study, Holloway and Wheeler (2002) defined trustworthiness as the methodological (research design, data gathering, data analysis) accuracy (soundness) and adequacy of a research inquiry. Hence, the trustworthiness of this study is grounded in the precepts of Lincoln and Guba (2007), which establish that credibility, transferability, dependability, and confirmability are key signposts for establishing the trustworthiness of qualitative research conducted at a given point in time. Trustworthiness is established when findings as closely as possible reflect the meanings described by the participants (Lincoln & Guba, 2007). Therefore, the trustworthiness of this qualitative research hinges on the following;

First, I resorted to triangulation (observation, interviews, FGD), peer debriefing, and member checking to ascertain the study's credibility. With triangulation, I used more than two data collection methods in the area of observation, interviews, and FGD to improve the credibility and authenticity of the research. During the observation conducted by the surrogate observers at the point of transmission of instruction at the various colleges in the study, a checklist was given to them based on how the synchronous instruction was conducted by the tutor, and the observed behaviour of the tutors was recorded per the dictates of the checklist crafted in alignment with the thematic areas of the study. Similarly, the interview guide and the FGD aligned with the observation checklist, accompanied by their sub-questions (sub-themes). This process helped to authenticate the data gathered. I also engaged in discussions with my colleagues, PhD candidates from other disciplines, on the initial findings of my research methods, interpretations, and results to identify biases, gain new insights,

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refine interpretations, validate findings, and enhance the credibility and trustworthiness of the research. In this regard, open and honest discussion allowed for critical engagement and reflection on the work to make room for consideration of alternative viewpoints.

During the member check, also known as participant validation, the interpretations, findings, and summaries were shared with the participants to verify the accuracy and validity of my understanding of the data provided. This practice helped ensure the accuracy and trustworthiness of the study, while also validating my interpretations of the data and providing an opportunity for participants to clarify or add information. In the process, the credibility of the research conducted is enhanced.

In summary, conducting member checks increases confidence in the study's findings and ensures that participants' voices are accurately represented. Bringing the issue of transferability into focus to ensure the study's trustworthiness, the method and methodological processes were reported in-depth and in context.

Additionally, the similarity between the study setting and the target setting in replicating the study under similar conditions could be a factor in establishing the study's trustworthiness. Again, the theoretical frameworks of the study can be applied to other contexts, and the results will not be different. Therefore, a detailed and nuanced description of the research context and findings was done to ensure the study's trustworthiness.

Moreover, the thorough documentation of the research methods, procedures, and assumptions manifests the study's trustworthiness. In a nutshell, the usefulness and applicability of the findings to other contexts ensure and enhance the transferability of this study.

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Confirmability was another indicator of the trustworthiness of this research. It underscores the degree to which the findings of this study are shaped by the participants and the problem studied, rather than my standpoints. At this point in the study, I established a journal to record my thoughts, ideas, preconceptions, and other biases that I had before and during the study. The raw data, including my voice-recorded interview and focus group discussion files, written observations, and other field notes and transcriptions of the interviews, were an audit trail purposely created to increase the confirmability of my study. This decision enabled me to distinguish between preconceptions, thoughts, and other ideas and what was actually observed at the end of the study. In sum, the evidence of the findings from the study is based on the participants' narratives and words rather than potential biases. This further explained that confirmability ensures the verification of the study outcomes by the participants rather than the researcher.

Last but not least, two experienced researchers, my thesis supervisors, vetted the research processes separately; their comments were compared, and corrections were made. The audit trail examined inquiry processes to ensure clear documentation, consistent data collection, and analysis, thereby ensuring the research's dependability. Equally, this study was allowed to be peer-reviewed by my fellow PhD candidates and other lecturers in my department who were interested in my research. I further submitted all my interpretations and analyses to the Graduate Academic Journal to receive more general comments. Therefore, ensuring dependability also increases the trustworthiness of the findings of this research.

3.12 Ethical Considerations

To begin with, to ensure the confidentiality of participants, the research adhered closely to its academic purpose. Based on this, the participants consented to the

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research being successful. The data acquired from the participants for analysis was also encrypted on my desktop to protect it from unauthorised access. Subsequently, the initial and final drafts on a soft-bound copy were kept in my library cabinet, where I deemed it safe, under lock and key. There was limited access, and only authorized personnel were allowed entry.

Regarding anonymity, I assigned pseudonyms, along with alpha-numeric codes, to the participants to protect their identities. Moreover, I clouded the participants' identities from the research records to avoid future repercussions. Again, identifiers such as names and locations of participants were removed, and no direct reference was made to that effect.

Furthermore, all references used in the study were duly acknowledged to avoid plagiarism. These related studies helped to direct the scope of the study.

According to Bryman and Bell (2007), any communication concerning research should be transparent and honest. Accordingly, I kept detailed records of the research method and methodological processes transparent. In this instance, the findings were initially validated by the participants, who provided the data for the study, to ensure that the results accurately reflected the data provided.

There was also open communication about the study's methodological processes, assumptions, and limitations, especially with my supervisors and peers involved in PhD research in other university departments.

Again, any potential conflicts of interest biases were all bracketed using assistant surrogate researchers, memos written before and during the research, and reflexive journals.

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Bryman and Bell (2007) further contend that respect for the dignity of research participants should be prioritised. Therefore, the participants in this study were assured of non-compromised self-esteem.

My department and the participants were asked for their full consent before the research was undertaken. The preliminary introductory letter issued to me by the Head of the Social Studies Education Department, University of Education, Winneba, in response to seeking permission from the school to enable the study to be carried out and onward submission to the participants, is a testament to the study's recognition of their full consent before the study was carried out. As a result, participants took part in the study based on informed consent.

Honesty was also ensured through the accurate presentation of the methodological processes and findings of the research.

Again, data falsification and fabrication were avoided through the verification and validation processes conducted by the participants, ensuring that the study's findings accurately reflected the data provided.

Last but not least, the study's acknowledgement of limitations also attests to the honesty of the research. Therefore, the priorities assigned to the stated processes were a testament to how ethical considerations were strictly adhered to in pursuing this research.

3.1 Positionality

Positionality "reflects the position the researcher has chosen to adopt within a given research study" (Slaven-Baden & Major, 2013, p. 71). This influences how research is conducted, its outcomes, and results (Rowe, 2014). It also influences what a researcher chooses to investigate in prima instantia (Maltterud, 2001; Grix, 2019).

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Consequently, in order to ensure that awareness of biases, reflexivity, and transparency takes the stage in this study, the following considerations were resorted to;

First of all, I was well aware of my identity as a citizen in the former Brong Ahafo Region, where the study took place, and did not let that influence my conduct of the study. So, emotions and sensitivities were taken care of in that regard, as personal sentiments and thoughts played no role in my analysis and inductive judgements. By reflecting on my biases, assumptions, and experiences, I effectively addressed any possible influences on the study emanating from those perspectives.

Also, the issue of self-awareness in data collection and analysis was considered. Hence, my position did not impact the power dynamics with the participants in any way, as I was committed to establishing the reality of tutors' online instructions in the CoE in the wake of the COVID-19 pandemic.

Furthermore, declaring my positionality in this study ensured transparency in its conduct and that it was done with a clear conscience and fairness. Declaring my stance on the study helped improve its interpretation by considering alternative perspectives.

Last but not least, cultural nuances and differences were taken seriously in the study to ensure a fair representation of the data received from participants. Therefore, by acknowledging, addressing, and reflecting on my positionality, I enhanced the trustworthiness of the research. In effect, by addressing positionality, the credibility and rigour of the research are improved.

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CHAPTER FOUR

FINDINGS AND DISCUSSIONS

4.0 Introduction

This chapter is devoted to presenting, analysing, and discussing the data using the research methodological processes described in the previous chapter. The discussion session aims to refute or confirm, adding to existing research by breaking new ground in online instruction by Social Studies tutors at Ghana's selected colleges during the COVID-19 pandemic era. The discussion draws heavily on the primary data collected from the field and the secondary data presented in the chapter on literature review.

The first part deals with the demographic characteristics of the participants. The second part analyses interviews and focus group discussions with the sampled participants (principals, tutors, and students) at the Colleges of Education where the study occurred. The results from the observations and the secondary documents analysed also played a pivotal role in discussing the data in this chapter. Ultimately, the chapter concludes with a summary of the study's findings.

4.1 Demographic Characteristics of Participants

The sampled population was made up of five (5) principals, ten (10) tutors, and twenty (20) Social Studies students from five (5) selected colleges of Education in Ghana, respectively. Subsequently, the participants' interviews were coded to facilitate the analysis.

4.1.1 Distribution of participants

The study participants were mainly selected college principals, tutors, and students. These groups of participants were the main sources of primary data collected for the study. As such, their identity was crucial for the study. The data provided by the

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participants in categories "A" and "B" in Table 6 shows that seventy per cent, which constitutes three of the principals, were in substantive roles as principal tutors. In contrast, two comprised thirty per cent of acting roles and were senior tutors. On the other hand, eighty per cent, which makes up eight of the participants in category "B", were "senior tutors". In comparison, the remaining twenty per cent, consisting of two in category "C", were tutors. Those in category 'D' constituted the 'students' representation. The distribution of the participants in Table 4 helped bring consistency in their desirable and cogent responses to the interview items.

Table 4: Distribution of Participants

Participant	**'A' (Principal Tutor) (No/%)**	**'B' (Senior Tutor) (No/%)**	**'C' (Tutor) (No/%)**	**'D' Student (No/%)**
Substantive Principals	03/70	-	-	-
Acting Principals	02/30	-	-	-
Tutors	-	08/80	02/20	-
Students	-	-	-	20/100
Total	**05/100**	**08/100**	**02/100**	**20/100**

4.2 Instructional Technologies Tutors Employed During the COVID-19 Pandemic

This section was guided by research question 1. The study asked the participants about the instructional technologies the tutors incorporated into their teaching and learning activities during the pandemic. To adequately answer this question, various interview items were resorted to. Through the inquiry, the participants were asked to indicate some of the instructional technologies available in their institutions for use during the COVID-19 pandemic.

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4.2.1 Available instructional technologies in the colleges for use during the COVID-19 pandemic

The following are the responses provided by participants regarding some of the instructional technologies available at their college during the COVID-19 pandemic. Participant SJCP revealed that;

> The school has computer and internet facilities at the ICT resource centre, equipped with Wi-Fi, to facilitate online and virtual academic work for tutors and student-teachers. Additionally, plans are well advanced to equip lecture rooms with similar facilities and projectors, making instruction in LMS, Zoom Video Conferencing, Google Meet, Skype, and other internet-based activities more convenient and easily accessible. This is particularly important in the current COVID-19 era, where in-person instruction is temporarily suspended.

BCP emphasised that;

> The school has internet and various facilities, including many computers that are well-fitted and protected in each lecture room for instruction. The COVID-19 pandemic has enabled us to realise the full benefits of the facilities, as physical interaction between tutors and students is not permissible. So, tutors and students engage in online teaching and cooperative learning with the aid of technological tools like WhatsApp, Google Classroom, and Zoom to engage the students in instruction.

SACP also responded by saying that;

> Although we have ICT facilities in our school, their full benefits have yet to be achieved since internet facilities are not as efficiently accessible as expected due to persistent flaws emanating from Telcos. This situation affects teaching and learning in the era of COVID-19, as distance and online tuition, as well as collaborative studies, are impeded due to inconsistent internet connectivity. Therefore, the facilities are available but have yet to be optimally utilised to promote instruction in this instance of COVID-19 and school closures.

ACP's view was not different from some of the earlier shared views when he said that.

> As COVID-19 is a pandemic, almost all our classrooms are equipped with whiteboard markers, screens, and multiple projectors. However, we are hindered by the inaccessibility of Wi-Fi, which, to a large extent, affects our instructional delivery.

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However, AFCP vehemently stated that:

> Indeed, my institution is disadvantaged in terms of modern educational technology facilities due partly to our relatively "infantile" nature. We still lack access to a Wi-Fi network and other essential educational technology equipment and tools necessary to facilitate teaching and learning. Some individual tutors try to provide such facilities as WhatsApp on their handsets to improve lesson delivery.

From the responses given, SJCP made it known that his school has computer and internet facilities at the ICT resource centre, as well as some lecture halls at tutors' disposal, and student-teachers to facilitate online and virtual academic work. This agrees with what BCP and SACP said. Therefore, tutors willingly use these facilities as needed. These statements made by the SJCP, BCP and SACP resonate with Huang, Liu, Tlili, Knyazeva, Chang, Zhang, Burgos, Jemni, Zhang, Zhuang, and Holotescu's (2020) perspective that the use of distance instructional programmes, online educational applications platforms, and other information communication technology platforms that schools and teachers can resort to, to reach learners remotely and limit the disruption of education, was highly endorsed. However, ACP, like AFCP, did mention that although their school is privileged with some computers and projectors, they lack Wi-Fi connectivity. The absence of Wi-Fi connectivity in ACP and AFCP's respective schools sharply contrasts with SJCP, BCP, and SACP's colleges. It, therefore, implied that some colleges were far more technologically endowed than others, and as such, determined the level of sustainability of online distance instruction during the pandemic. Adding his voice to the discourse, Holmes (2006) stated that the broadening of computer technology, the internet, and online tools as an area of interest in academia has improved that sector. It could, therefore, be inferred from the responses that many of the colleges of education in the investigation are equipped with one form of computer technology facility or the other. This, to some extent, enabled some of them to engage their students with Zoom Video

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Conferencing, LMS, Google Meet, and WhatsApp technology in instructions during the period of the pandemic upon their realisation of their usefulness and conception of their ease of use as indicated by Davis's TAM of 1989, and Rogers's (2003) IDT. So, realising the novel instructional technology tools available on the internet and their ease of use, these tutors decided to utilise them in their lessons to bridge the yawning gap created by school closures due to the COVID-19 pandemic. The students' mass participation also attests to their approval of the computer technology their tutors employed.

On the other hand, technological inadequacies prevented some of them from realising the full benefits of the available facilities. Instances like these make Eady and Lockyer's (2013) assertion very viable, as they postulated that with technology now dictating the pace of all facets of human life, it is about time that curriculum planners and implementers integrate technological tools and equipment into the curriculum to make it more entrenched in the schools' pedagogy.

Regarding Eady and Lockeyer's remark, Aboagye and Yawson (2020) emphasised that the revised Ministry of Education (2018) curriculum framework prioritises the use of ICT as a pedagogical tool. This endorsement by the ministry also serves as an endorsement of Rogers's (2003) IDT in instructional delivery, where adaptation to ICT has gained widespread recognition. Unfortunately, using ICT as a pedagogical tool for the new curriculum does not align with the Ghanaian school infrastructure, as some teachers lack access to the communication network. Hence, the prevalence of COVID-19 presents a good opportunity to make the necessary technological facilities accessible to facilitate instruction.

Some CT participants responded to the instructional technology facilities available to their college in these ways: SJCT-1 stated that.

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> The college has improved its computer technology facilities, which we used to access the LMS and Google Meet online during the COVID-19 pandemic. However, intermittent power cuts have been our main problem in effectively utilising the internet to reach our students for distance instruction.

SJCT-2 also resonated this better when he said that;

> As long as every one of the six college departments has a projector without a laptop in their custody, it is challenging for them to be well utilised. Although some lecture halls are fitted with tabletop computers, they may not be in good condition. This inconvenience typically makes it very difficult for us in this pandemic era to reach students effectively. However, I have a laptop that allows me to use Zoom or LMS with the help of Wi-Fi, enabling me to engage students during the COVID-19 pandemic. So, yes, some internet and other instructional technology facilities are available, but they are grossly inadequate.

BCT-1 equally contends that;

> Our classrooms indeed have a good number of computer technology facilities. Nevertheless, to my knowledge, some of them are not in good condition. So, it amounts to not having them, as many are not functional, and the purpose of fixing them in the lecture rooms is defeated. However, I utilise Zoom videoconferencing with my gadgets to engage the students during this COVID-19 pandemic.

BCT-2 expressed no different view when he uttered that;

> Although the school has been equipped with some computer technology devices for some time, they have been malfunctioning for quite some time now and cannot be relied upon for lessons, as many of them are broken or stolen by thieves. It is also challenging for us to sustain online tuition during COVID-19 due to the college's technological inadequacies. Nevertheless, I reach out to the students at my own expense through Google Classroom to engage them in a lesson.

SACT-2, from his perspective, responded that;

> Except for the ICT resource centre, which is generally open to tutors and student teachers, not much can be said about the ones needed in the lecture rooms specifically, since there is practically nothing to discuss. Meanwhile, COVID-19 has compelled us to devise ways to reach students through Google Meet or Zoom technology, which I deem appropriate.

AFCT-1 voiced out that:

> Although we are told that our school has been supplied with facilities, such as projectors and computers, specifically to facilitate instruction,

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> the less said about them, the better, since we do not have access to them during instruction. However, I sometimes provide instructional information to students through a WhatsApp group created for academic purposes on our cell phones, as it is more accessible and affordable.

A level of consistency has been established in the responses given by participants. For instance, SJCT-1 and SJCT-2 shared similar convictions in their submissions, affirming that some computer technology facilities are available in their college but are grossly insufficient and cannot be effectively relied upon for academic work. This explains why, to a large extent, some college tutors depend on their handsets and other personal gadgets to get their lessons done on LMS, Zoom Video Conferencing, and Google Meet, among other tools, especially during the COVID-19 pandemic. For instance, according to Tenebruso (2020), the Zoom video conferencing online facility ended the second quarter of 2020 with more than 370,000 customers, representing a stunning year-over-year growth rate of 45.8%. Consequently, the provision of digital resources to facilitate instruction at the colleges of education, as the participants indicated, is in alignment with Daniel's (2020) revelation that educational organisations should increase the opportunities for distance education through digital resources, using them in organising asynchronous instruction, especially in the period of a pandemic like COVID-19 when in-person interaction is impossible. The participant's submission further aligns with the ADEA, AU/CIEFFA, and APHRC (2022) submission, which identifies distance teaching and learning tools, as recommended by GPE, to enable all teachers to sustain instruction in the event of school closures, as commendable and worth emulating. These studies by Daniel (2020) and ADEA, AU/CIEFFA, and APHRC (2022) exhibited that using alternative technological processes to sustain instruction by the tutors of the CoE in the study was

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not misplaced and efforts must be made to ensure that it thrives side-by-side with the in-person instruction irrespective of the environmental circumstances prevailing.

Relatively, to ascertain or disabuse the facts in the issues stated by the CP and some members of the CT participants, a virtual visit by Zoom to some of the lecture theatres reaffirmed that although many of them were fitted with projectors and Wi-Fi networks, among others, some of them were broken down and lack the needed repairs, or those that are in use are not reliable especially the Wi-Fi connectivity. From this researcher's perspective, these occurrences somewhat explain why some of the CT participants chose to use their gadgets before, during, and after instruction, despite the inadequate computers, projectors, and internet accessibility issues that arose during the COVID-19 pandemic. This is a clear case of technology acceptance and adaptation (TAA) as professed by TAM and IDT models used in this study.

It was concluded that Zoom Video Conferencing, LMS, Google Meet, Google Classroom, YouTube videos, and WhatsApp technological tools were the main online tools available to tutors to ensure the sustenance of instruction during the COVID-19 pandemic.

4.2.2 Number of years tutors have been using technology in instruction

Participants were further asked to indicate how long they have used technology in instruction. These were what the CP participants had to say;

SJCP said that

> Manipulating some of the facilities is difficult. As such, some tutors who complain of being born before computers do not often use them. Nevertheless, those who have consistently used technology in instruction have been doing so for 6 to 16 years in their college instructional delivery.

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BCP also mentioned that

> Indeed, some of the tutors have been using computers and projectors in their lessons for over 7 years. However, it was not until the COVID-19 pandemic that some tutors began to emphasise the use of technology in instruction, although technological facilities had been available for some time.

SACP says

> Some tutors have been conversant with using technology in instruction for about four years. This college is relatively young, so some tutors may have used some of these tools in their instruction before coming here, observing how they are manipulated in their lessons.

ACP equally said that

> Before the COVID-19 pandemic, some tutors had been using projectors and computers for lesson presentations for approximately 3 to 5 years. However, during the COVID-19 pandemic, when schools are temporarily closed, the internet is essential for accessing distance learning. I am unsure how long tutors have been accessing the internet independently, as our internet facility is unreliable for their tutorials.

AFCP said

> Although our computers and projectors for the tutors are inadequate, some of them have been using these facilities in their lesson presentations for about three to four years, since our institution's inception, which is now between two and three years old. This was before COVID-19, when no Wi-Fi connectivity was emphasised due to the face-to-face mode of instruction.

The responses of SJCP and BCP show that tutors have been utilising instructional technology for between 6 and 16 years, whilst SACP and ACP have been using technology in instruction for 4 and 3 years, respectively. A similar thing cannot be said about AFCP, which indicated that tutors have barely 2-3 years of experience at the time of this study. By implication, the SJCTs and the BCTs, showing some consistency in instructional technology, can be referred to as the early adopters and the early majority of innovation usage, according to IDT. In contrast, in an innovation diffusion process, according to Rogers (2003), this group of tutors need to try the technology to see if it is of essence to their course. Then comes the late adaptors who

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might have had information about the new technology in question regarding its usage and how it could help the course of their activities and hence also adopt it in the process, in the persons of SACTs and the ACTs with 3-4 years of technology utilisation in instruction. The traditionalists or the "laggards" are the AFCTs with 2-3 years of technology utilisation in instruction experience for the fact. In the context of this study, they were the younger and most deprived instructional gadgets community, who were the late or non-adopters to the point of being isolated from the other categories of adaptors (Rogers, 2003), so the laggards, according to the IDT, linger or lag as the innovation adopted by them might have probably become obsolete. So, irrespective of the challenges the use of technology in instruction presents, the responses manifest that the tutors have acquired some experience in using technology in instruction.

This explains why some of the CPs suggested that many tutors in the colleges during the COVID-19 pandemic, where in-person interaction was not permissible, always utilised some form of instructional technology to make for temporary school closures. Subsequently, the opinion of the Government of Ghana (2020) that every teacher wishes to transmit the requisite knowledge to the learner with the best available tools and equipment holds and agrees with the submissions made by the participants in this study. Unfortunately, efficient instruction in the educational setup around the world relies heavily on the teacher's skill level in the selected field and the awareness of the available technology and tools (Asebiomo, 2001). So, the tutors' experiences in technology usage aided them in their instruction during the COVID-19 pandemic.

The CT participants, in their quest to respond to the question of "the period they have been using technology in their instruction," came up with the following responses;

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SJCT-1 mentioned that

> I have been using the computer and projector without the internet in my instruction for almost 18 years. Now, with Zoom Video Conferencing and Google Meet in attendance, my experience in online teaching spans the last eight years, within a total of 18 years. So, I have always been using technology in instruction.

SJCT-2 also indicated that

> I have habitually used computers in my lesson delivery, particularly in Google Meet and Google Classroom, for nearly 10 years of my responsibility as a Social Studies tutor in college. I think it is very refreshing to see much more improved technological tools and equipment now in academia that facilitate work processes than before

BCT-1 says that

> I have been using instructional technology in my teaching for 11 years at the college level. I still believe I will continue to use Google Classroom technology, for instance, in my teaching even after the COVID-19 pandemic, as we revert to face-to-face meetings. I said so because I have gained more experience incorporating online teaching into my lessons, which has not been emphasised so much.

BCT-2 stated that

> I have 10 years of experience teaching with technological gadgets, which has significantly improved my in-class delivery. Over the years, I have established computer instruction as a culture in my instructional space, so my class activities are incomplete without computer assistance.

SACT-1 did indicate that

> I have been using a computer in my lessons for about seven years, but I have occasionally used online tools like Google Meet due to the pandemic. I came here 4 years ago. The first year was basically for observation. I started practical teaching three years ago, using online instructional technology tools parsimoniously due to the cost of their maintenance, as I use my data, even during the COVID-19 pandemic.

SACT-2 maintains that

> I am in my sixth year of delivering lessons with a computer and projector, without Wi-Fi. I used it for my face-to-face PowerPoint lesson presentation before the COVID-19 pandemic set in. However, our school's Wi-Fi is unreliable, so I occasionally use Zoom for distance learning.

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ACT-1 also stated that

> I started using computer technology in my instruction three years ago. However, we are not connected to Wi-Fi and therefore cannot access the internet. I only used it for a lesson presentation, which was non-Internet-based, before COVID-19 erupted. The absence of Wi-Fi for instruction during COVID-19 sometimes forces me to use my cell phone to link students on WhatsApp for tutorial notes, as I am unable to meet in person.

ACT-2 similarly indicated that

> I have been here for the past 10 years. However, I started incorporating computers into my lessons about four years ago, although not consistently, because we are limited by Wi-Fi connectivity.

AFCT-1 stated that,

> I am inconsistent with using technology in my lessons since we do not have the accompanying facilities. I do not have a personal computer, so to speak, and what we have here is also insufficient. My inconsistencies in using technology in instruction took me about two years to overcome.

AFCT-2 suggested that,

> I have hardly used technology in my instruction for the past four years. Although I have basic skills in PowerPoint and word processing, inadequate technological tools deter me from utilising them effectively. I apologise, but I am unable to quantify the amount of time I have used technology in my instruction. In sum, it has been barely two years.

The responses provided by the CTs generally support the views previously expressed by the CPs regarding consistency with instructional technology. It was noted that the SJCTs and the BCTs have had experiences in the use of instructional technology always, ranging from 10 to 18 years, depicting them as early adaptors and early majority in the innovation diffusion (ID) process, whilst the SACTs and the ACTs use technology in instruction occasionally, and sometimes respectively, as they constitute the late adaptors or majority. Their experience ranges from 3 to 10 years in adapting technology to instruction. However, AFCTs were observed in the innovation diffusion process, with their 2–3-year experience as laggards, as they also rarely utilised online

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technology in instruction during the pandemic. So Gyampoh et al.'s (2020) submission that a Virtual Teaching Taskforce (VTT) was put in place to ensure that "there is continuity in teacher education through virtual and online teaching and learning until face-to-face become viable" contradicts the case of SACE, AFCE, and ACE who were virtually deprived of the requisite Wi-Fi resources required to ensure the realisation of the objective of the taskforce adequately. In this instance, online teaching and learning could not go as expected in the affected colleges. So, Gyampoh et al. 's submission was very subjective and conflicted with the study's SACE, AFCE, and ACE cases.

This situation buttresses Rogers's (2003) submission that in the process of innovation diffusion, the main attributes that must manifest if the rate of adaption is to improve are relative advantage, compatibility, complexity, trialability, and observability. From the empirical viewpoint of this study, many of these indicators were missing in the earlier identified colleges. Rogers further emphasises that "individuals' perceptions of these characteristics predict the rate of adoption of innovations" (p. 219). may hold. This is because the rate of perception of the indicators mentioned by Rogers determines the extent of usage of the online instructional technologies involved in the tutors' lessons, irrespective of their low or high grades. Other factors that might have also influenced the tutors' innovation adaptation, as agreed upon by Rogers, boil down to optionality, authority, network interconnectedness, and agents of change.

It could be inferred that although not all tutors utilised online technology during the COVID-19 pandemic, they expressed some basic knowledge of computer utilisation in instruction. Indeed, the CP participants bear some level of correlation in their submissions with the responses given by their CT counterparts. SJCPs correlate with

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the range given by the tutors from his school, as 10 to 18 years of technology adaptation by SJCT-1 and 2, respectively. Hence, the level of adaptation in this instance connotes a rich experience of technology utilisation in instruction by the Social Studies instructors in that college, compared to AFCP's assumption of 2-3 years for their tutors in the investigation. This signalled that at the time of the COVID-19 pandemic, the ACE and the AFCE tutors, whom the study identifies as "laggards", used "low-grade" technology (WhatsApp and Telegram) for their distance instruction during the school closures.

Therefore, it was understandable that continuous engagement with a given technology in the work process could improve the capacity to deliver enhanced services and outputs. This was revealed by a minimum range of 2 to a maximum of 18 years of consistent use of computer technology in instruction by the tutors.

4.2.3 On-the-job training on how to utilise specific instructional technology

Responding to "on-the-job training on how to utilise specific instructional technology to facilitate instructional delivery during the COVID-19 pandemic", SJCP participants in category CP emphasised that:

> We have tasked our Information Technology (IT) department with organising workshops and training programmes to update our tutors on how to incorporate technology in teaching to enhance the delivery of instruction. Indeed, these workshops and training regimens have proven significant to the teaching faculty and students in their teacher training programmes.

BCP mentioned that;

> Generally, career development for our tutors has been an important part of the college programmes in the semester. Some days have been set aside to update our tutors on emerging issues related to the development of their instructional delivery.

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Participant SACP confirmed this assertion when he indicated that;

> Tutors have attended career workshops and training programmes within and outside the college. Within the college, the T-TEL secretariat, in collaboration with the Ministry of Education, has been taking care of that on Wednesdays every week. At the same time, other governmental organisations occasionally organise workshops and training programmes outside the college for selected tutors on teacher-training curricula.

ACP claimed that;

> In frank terms, the college has not yet organised on-the-job training on using specific instructional technology in instruction. However, the college is fortunate to have a workshop generally organised for our entire teaching staff on the transformation of teacher education and learning, which incorporates different perspectives in the teaching and learning process. We anticipate such a workshop sooner rather than later to imbibe the much-needed innovative concept into the instructional process.

AFCP alleged that;

> Initially, our tutors attended workshops at sister colleges, such as the SJCE. This is because our school came on stream when our sister college had already begun the T-TEL workshop. We were tasked with accessing their resource persons to update our tutors on the expected transformation processes, enabling us to align our job performance as a teacher training institution correctly. Specific training, however, was not available at that time. However, the college hopes that part of career development will soon be part of our retraining agenda as we get some of the technological equipment, which we so much desire to facilitate our teaching and learning.

The discourse here indicates that some of the colleges in the study have incorporated "on-the-job technology utilisation into instruction" workshops as a vital component of their professional development programmes. On the other hand, their sister colleges in the investigation have yet to expose their tutors to this all-important segment of instructional delivery in Social Studies education. Their inability is partly blamed on the unavailability of technological facilities to facilitate this process. It was therefore declared that this important aspect of teacher training venture would be well implemented as and when their college is furnished with the required technological

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facilities to improve teaching and learning. In doing so, the technological know-how of tutors, in their opinion, could be enhanced. However, Rogers (2003) postulated that adopting an innovation is synonymous with knowledge, persuasion, and the decision to reject or use the innovative technology identified. So, manipulating the technology involved in instruction helps the teacher be abreast with the capacity required to facilitate its utilisation with little or no stress. In response to the discussion, Jaipal-Jamani et al. (2018) pointed out in their study on "workshops for capacity building" that taking on technology leadership roles as workshop facilitators effectively builds faculty capacity for technology-enhanced instruction. Faculty pointed out that being invited to be a workshop leader allowed them to take on a role they may not have thought they could do. Hence, Rogers's submission that the knowledge about how to utilise the recognised innovation and the likelihood of being influenced about the expediency of the concept is most probable to encourage the potential user to accept it is tenable to "on-the-job training" that is geared towards capacity building of tutors in technology utilisation in instruction. This situation made them take risks and expand their knowledge of technology and pedagogy.

Jaipal-Jamani et al. (2018) asserted that regular workshops for tutors to get them abreast with modern trends in knowledge dissemination was very vital since it was revealed by one of the participants that workshops organised for them from time to time helped them to overcome some of the challenges associated with the manipulation of tools like computer and projectors in their instructional delivery since some of them were born before computer. This also supports the view shared by Rogers earlier. So, without a doubt, Jaipal-Jamani et al.'s (2018) postulate that the workshop for tutors on incorporating technology into instruction is vital and key to this study. Harleem et al. (2022) also emphasised that technologies can provide in-

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service training online. According to them, there is evidence that instructors require better incentives. Unfortunately, Harleem et al. stated further that instructors can educate with technology, but some lack the motivation. Although teachers use videos to teach, they are not always as effective as they would be if they were standing in front of the classroom.

This suggests that, despite the contribution of technology in bridging the gap created by school closures, in-person instruction remains preferable, given the experiences teachers have gained in integrating technology into instruction, with the hope of achieving the desired benefits. However, there has always been the case where education transcends the boundaries of the classroom, ever-changing conditions, the level of computerized, and far-reaching situations, call for remarkable adjustment, aid as well as a commitment to digital instruction a permanent component of lesson delivery in the 21st century, where the COVID-19 and other emergencies necessitate social distancing of all forms.

Capacity building in teacher education enables tutors to adapt to the emerging trends in educational delivery, particularly in emergencies such as the COVID-19 pandemic. In all sincerity, it made a strong case in favour of on-the-job training and workshops to aid faculty in becoming more astute and responsive to the demands of 21st-century educational delivery in colleges of education in Ghana and elsewhere. Adding their voice to this discourse, SJCT-1, ACT-1, AFCT-1 and 2, SACT-1 and 2, and BCT-1 and BCT-2 gave the ensuing responses;

SJCT-1 revealed that:

> We in the Social Studies unit of the Social Science Department, along with my colleagues from other departments, are occasionally required to attend on-the-job career development training and workshop programs at designated locations to stay updated on emerging educational technology trends in teacher education.

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ACT-1 similarly indicated that;

> Workshops and training programmes have become part of our daily routine as tutors since the GTEC; in their imagination, the view is that teacher education is supposed to be dynamic enough to stand the test of time. As a result, workshops are, from their perspective, the antidote to reequip tutors, enabling them to meet the constantly changing demands of their job. Consequently, workshops have become an indispensable part of our responsibilities.

Participant AFCT-1 correspondingly proposed that;

> Initially, we attended workshops and training programmes on T-TEL at intervals at St Joseph College of Education and Berekum College of Education. However, now, we do it here on our campus every Wednesday.

AFCT-2 equally proposed that;

> We attend workshops on campus, but other training programmes are organised outside the school's premises at certain times. These workshops have helped us bridge the gaps that technology poses in our teaching and learning activities.

SACT-1 similarly contends that,

> Essentially, we have general training and workshop programmes on our campus, organised by T-TEL and GTEC, focusing on the changing face of teacher education. Some of our Social Studies colleagues occasionally attend other educational technology training programmes on educational technology for the retraining of those who were not privileged to attend such workshops. However, information technology resource deficiency makes it impossible for us to practicalise what we have learned to the detriment of our student-teachers.

SACT-2, in agreement with SACT-1, opined that;

> The introductory and reliable workshop we have had and continue to engage in so far is T-TEL, which has to do with all the courses we do on campus here. Aside from this, not much can be said about training in instructional technology on Social Studies.

BCT-1 declared that;

> Fundamentally, we have incorporated ICT into the Social Studies lessons training programme during the COVID-19 pandemic. Aside from that, the weekly T-TEL training workshop has been ongoing for nearly five years now, if my memory serves me right.

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BCT-2 also added that;

> The colleges of education have been attending IT workshops within the zone to engage in short training programmes that equip them with some of the essential application tools for computer technology and other related equipment to facilitate instruction.

These contributions were made by the SJCT-1 and 2, BCT-1 and 2, and SACT-1 and 2 participants on "on-the-job" training on instructional technology. Social Studies tutors have shown that they have had one form of on-the-job training. Lion and Stark's (2010) study on how educational institutions support faculty with designing and developing web-based classes, for instance, indicated that some institutions only offer technical training. In contrast, others offer technical and pedagogical training to faculty, attesting to the significance of on-the-job training on instructional technology for Social Studies tutors in the current dispensation of knowledge at the colleges of education in the study area, more importantly during the era of COVID-19. From the perspective of Harleem et al. (2022), these technologies have a powerful impact on the educational system and acceptance regarding their ease of use and usefulness, as indicated by Davis's (1989) TAM. They also indicated that the COVID-19 pandemic has further institutionalised the applications of digital technologies in education, particularly in transmitting information in a teaching environment. As Davis's TAM emphasised, These sentiments indicate the inevitable need for technology incorporation into work processes.

From the viewpoint of SJCT-2 stated that;

> I had an appointment at the college when the technology into lesson workshop had already been completed. Since then, such workshops have yet to be organised for us, so I could also have been lucky to be part of one.

ACT-2 echoed that;

> Since my appointment at the college, I have not been privileged to attend IT workshops and training programmes. It has not been easy

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> since some of us must align ourselves with the technology-propelled changing trends in lesson delivery.

ACT-2 shared the notion that;

> Specifically, I have not attended on-the-job instructional technology-related training programmes except the one the school has recently organised for us.

BCT-2 too reported that;

> I attended a private training course on Computer applications in word processing, excel, PowerPoint presentation, and graphic design while at the University for undergraduate and graduate programmes, respectively. However, there has not been such specific on-the-job training on technology that I have attended.

These respective views on "on-the-job training of tutors on educational technology" suggest updating tutors' knowledge to be more abreast with the changes associated with information dissemination in college education. Lion and Stark's (2010) perspective on this matter stimulates the submissions made by the SJCT-2, ACT-2, and BCT-2 when they admit that members of the faculty may be allowed to be mentored in an instance where they do not have the necessary knowledge and skills to live up to desired standard in terms of capacity to deliver a technologically-ladened instruction with all the confidence and vigour it required. This contention was appropriate since mere knowledge of technology does not translate into practical depiction in the instructional environment. Contributing to the discourse, Mishra and Koehler (2008) argue that knowing how to use technology does not necessarily mean knowing how to use it effectively in teaching. On that basis, Davis (1989) and Silva (2015), in an illustration of the TAM, stated that the external variables, peoples perceived usefulness of the technology they intend to use, perception of ease of use, and their attitude toward usage, could determine the decision of that individual to use the technology in question eventually. CoE teachers should acquire the knowledge, attitude, and skills to effectively integrate information and communication

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technologies into their teaching processes (Şad et al., 2015). Sad et al.'s re-echo of Davis's TAM perspective anticipates what technology can offer in educational information dissemination. This presupposes that tutors at the colleges of education should endeavour to obtain the requisite technological knowledge that can appropriately impact their teaching and learning, as earlier endorsed by Rogers (2003), where tutors who were early adopters demonstrated their readiness to use technology in instruction with a high-grade technological tool during the COVID-19 pandemic period. The late adopters and laggards, such as the ACTs and AFCTs, demonstrated that they were not ready and subsequently adopted low-grade instructional technology to engage some of their students in distance asynchronous instruction. This reveals why Latchem et al. (2006) assumed that their findings are applicable, as they reported that faculty members require professional development, regardless of rank, location, or personal circumstances. It is then not surprising to observe career and professional development programmes started by the Ministry of Education in partnership with BODA, christened Transforming Teacher Education and Learning (T-TEL), which run from 2014 to 2020 and has now evolved and continues to work in Ghana education sector, to ensure that faculty at colleges of education in Ghana acquire the needed knowledge and skills in career development to enable them to function and overcome fundamental but intense modern technological problems facing them within their instructional environment becomes very vital. In general, the participants' views in the FGD and the interview aligned with the authors' views.

The participants' responses confirm the views of Huang et al. (2020), who argue that consciously tailored specific training programmes on online instructional technology

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in Social Studies education are essential elements for effective instructional delivery and cannot be downplayed if higher productivity is to be achieved.

4.2.4 Motives for the Utilisation of Instructional Technology

As it progresses, the study highlights the motivations for utilising instructional technology in instruction during the COVID-19 pandemic. Consequently, the CP participants shared the following motives: SJCP suggested that;

> The rationale is to make teaching and learning stress-free and more sustainable, applying these principles in the circumstances they find themselves in, such as the current COVID-19 era, where knowledge in educational technology dictates the pace of academic work due to the temporary closure of schools. We had no option, for instance, to engage the students in some distance learning at that time to mitigate the situation. That is when the knowledge of educational technology became highly beneficial to both tutors and students.

BCP echoed that

> Instructional technology is used to help students better understand the lesson and bring reality to the doorstep of learners. Moreover, the lengthy verbal communication between the teacher and students is to some extent curtailed, as much of the instructional output in technology applications is visual, conducted through virtual learning, especially in the instance of the COVID-19 pandemic, where face-to-face meetings between faculty and students are not permissible.

SACP likewise conveyed that;

> Some tutors resort to educational technology partly because they are intensely interested in and easily manipulate technological devices, such as iPads and smartphones. Therefore, incorporating some educational software into their lessons is a sign of motivation and addresses the individual differences among the ability groups in the class.

The BCT-1, SACT-1, and SJCT-1 are of particular note, underscoring that the infusion of educational technology into instruction provides insight into the lessons taught. They individually responded as follows;

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BCT-1 proposed that;

> As tutors, the key element expected to be demonstrated in your tuition at the end of your lesson is the learner's ability to comprehend and apply what you have taught them. In this regard, the involvement of computer devices and other learning software usually plays an important role in the success or otherwise of your lesson.

SACT-1 compatibly anticipated that;

> Learning with educational devices, such as computers, tends to enhance teaching and learning. Unfortunately, some people are not accessible to the Internet, which is viewed as the information communication highway where invaluable sources of knowledge abound. Unquestionably, the contribution of technology to education cannot be downplayed.

SJCT-1 asserted that;

> The motive for incorporating technology in my daily lessons is to expose the trainee-teachers to up-to-date technological teaching and learning processes. Exposing student-teachers to learning tools like LMS, Skype, and Zoom gives them the confidence to excel in future tasks ahead of them as professional teachers. Equipped with this information, students' desire and willingness to often use them in their learning process, at their convenience, to execute assignments, class exercises, project work, and quizzes, is assured.

It was observed from the submissions made by the CP and the participants of BCT-1, SACT-1, and SJCT-1 that the benefits accrued from the use of instructional technology, including the sustenance and enhancement of academic work during the pandemic, were among the key motives for the application of educational technology. Eady and Lockyer (2013) postulate that teacher educators and researchers signal the likelihood of technology to improve the motivation and engagement of learners, cater to different learning styles, and improve learning outcomes as among the motives of applying instructional technology at a given session, offers further insight into the earlier on made submission by the participants of this study. Indeed, Granic and Marangunic (2019) stated that studies confirm the TAM model has evolved to become the standard theoretical framework in understanding predictors of user goals toward technology use. This presupposes that TAM, as used in instruction, is intentionally

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designed to achieve a specific end, as demonstrated by participants in the study through an instructional process.

Equally, participant BCT-2 stated that:

> During the peak period of the COVID-19 pandemic, students' assignments were often given on Google Classroom and WhatsApp platforms, typically in PowerPoint format, while other teaching and learning activities were conducted via Skype and Zoom in our day-to-day instructional activities. Therefore, almost all the lessons were conducted virtually using computer technology, as in-person interaction was not permissible during the COVID-19 era. In all these, it is the aspiration of tutors that the trainee teacher will have the opportunity to gain experience in the practical application of technology in lesson delivery, so they can also replicate it in their future lesson delivery.

SACT-2 verbalised that;

> Although my school is not technologically advanced in terms of educational devices, some of us are driven to utilise our tools to deliver instruction in the interest of students who exhibit enthusiasm for these devices during the COVID-19 pandemic.

SJCT-2 articulated his views this way;

> My interest in the series of educational software that comes with the emerging smart devices and the ease of their manipulation in my lessons has been the motive behind my employment of educational technology, specifically my students' assignments, quizzes, short tests, and other class activities.

The need to keep pace with society and prepare students for their roles in it was one of the motives behind the integration of technology in education, as purported by Eady and Lockyer (2013). It is equally no coincidence that Yalcin et al. (2011) aver that pre-service teachers always model and imitate the lecturers. In their view, more opportunities for teacher-trainees may be created as they witness the good side of technology integration in teaching. Therefore, the perceived usefulness of TAM, as shown by Eady and Lockyer (2013) and Yalcin et al. (2011), has a direct impact on users' attitudes toward employing a given technology, particularly in terms of their perceived usefulness and perceived ease of use in instructional processes. In effect,

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both philosophies hypothesised are directly influenced by external variables in system design characteristics and users' self-efficacy in using the technology (Davis, 1989) in question in the instructional process.

Therefore, the use of technologies by Social Studies teacher educators in their lessons makes it worthwhile, advantageous, educative, and effective for teacher-trainees to replicate their tutors' online educational technology in their future instruction at the basic level. This indicates that TAM has become one of the most reliable models for investigating user technology acceptance and usage behaviour (Granic & Marangunic, 2019). Additionally, in Klein's (2005) submission, instructional resources support teachers' valuable educational practices that meet students' needs. This assertion by Klein also confirms the responses given by the participants, who mentioned that their choice of instructional technology tool was partly dependent on the needs of their students at the time. Eady and Lockyer (2013) further confirm that tutors use instructional technology to stimulate students to work individually or in group collaborative study, engage the learners in activities that are not possible in the classroom, and allow students to work at their own pace as a review or extension activity. TAM, in this instance, becomes relevant when tutors, during their online tutorials with students during the COVID-19 pandemic, found that the perceived ease of use of a system could promote perceived interaction not only between them and their students but also with the entire communication system in use.

In this regard, Davis's (1989) TAM suggests that when users are presented with a new technology, several factors influence their decision about how and when they will use it. Davis's TAM provides guidance on what typically necessitates the use of technology in instruction. It is noted that computer self-efficacy (Al-Azawei et al., 2017; Cakır & Solak, 2015; Cheung & Vogel, 2013; Yeou, 2016), learner experience

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(Liu et al, 2010; Ros et al., 2015), technical support (Cheung & Vogel, 2013; Sánchez & Hueros, 2010), perceived convenience (Yu-vying & Hsiao-hui, 2012), subjective norm (Song et al., 2017), and cultural factors (Sang et al., 2010), motivates a teacher's TA in instruction. These views, expressed by the authors, affirm Davis's (1989) external variables. Consequently, the diverse suggestions of the participants in the investigation on motivation for technology usage in instruction align with the inputs made by the authors.

So far, the responses presented by the participants, who discussed the theoretical and conceptual models, show that each tutor utilises technology for a specific purpose, regardless of the topic of the lesson. Their submissions further demonstrate that the COVID-19 pandemic accelerated the use of technology in instruction to bridge the temporary gap created by school closures and social distancing protocols.

It is pretty noticeable from the discourse that although varying factors motivate tutors' usage of technology in instruction at a given period, a good number of the tutors desire to sustain academic work during the COVID-19 pandemic to attain optimum productivity in their lessons, even in the face of unreliable internet facilities signified their motives behind technology utilisation in their instruction.

Subsequent responses from the CP participants on what motivates tutors to integrate technology into instruction during the pandemic revealed the following;

In contrast to the earlier made submissions, ACT-1 and ACT-2 2 and AFCT-1 and AFCT-2 still resort to the traditional "talk and chalk" procedure without recourse to "modern technology". However, they indicated that most students do not prefer this "talk-and-chalk" procedure. For instance, AFCT-1 confirmed that;

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> In many circumstances before the COVID-19 pandemic, I used the markerboard and marker to transmit knowledge in my lessons. Almost all activities were done with illustrations on the board, including class tests and quizzes. However, it is now tricky to physically engage students with "talk-and-chalk" during this period of COVID-19 due to temporal prohibitions. However, resource constraints also make it difficult to use online instruction, as we all expect.

However, handset incompatibility with some applications, such as those for Android and Apple devices, poor internet accessibility, and intermittent power failure are some of the challenges students may face when applying computer-related technology in instruction. Notwithstanding, in the wake of these possible challenges in some colleges, tutors exhibited higher motivation to deliver their lessons using modern technological processes, partly due to the high level of interest students show during such instructional hours. As tutors realise the ease in the use of LMS, Zoom, and WhatsApp technologies in knowledge transmission in instruction, they feel they are useful irrespective of their initial rejection of the innovations in the presence of Granic and Marangunic (2019) stated that studies confirm that the TAM model has evolved to become the standard ground theory in understanding prognosticators of user goals toward the usage of technology. This presupposes that TAM, as used in instruction, is purposely meant to achieve a given. During the COVID-19 pandemic, partly due to technological challenges, they decided to devise their means of accessing the technologies, given their usefulness as indicated by TAM, and they feel it is more beneficial to their course. This was in affirmation of Eady and Lockyer's (2013) findings, which reiterated that teachers use digital resources for various purposes, including as a stimulus package for group or whole-class discussion and to engage students in activities that are impossible in the classroom. Students working at their own pace as a review or extension activity was also indicated by Eady and Lockyer as one of the rationales for tutors' application of instructional technology.

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This stance, put forward by Eady and Lockyer, suggests that during the COVID-19 pandemic, several technological options were available for tutors at the CoE to explore in the instructional delivery of instruction. Hence, the larger sample size of 35 participants in this study supports the authors' findings on this issue.

In sum, tutors' use of diverse online technological tools and equipment to engage their students in instruction ensured that academic work was not disrupted despite the COVID-19 scare. This suggests that technological innovation in instructional delivery is a worthwhile intervention and will play a meaningful role in academia in the years to come.

4.2.5 Period of use of instructional technology

Further inquiry made on the period the tutors make use of instructional technology in their lessons produced the following responses;

Accordingly, SACT-1 indicated that;

> I must be honest: I use it occasionally. Although I am enthused about the Zoom video conferencing facility in instruction, I am constrained by resource scarcity. Other than that, I would be using it in almost all my instruction from the beginning to the end in this era of COVID-19, for instance, where there is little or no contact between us and the students.

SACT-2 submitted that;

> In my college, I teach almost 150 students in a face-to-face class. However, due to the COVID-19 pandemic, such a meeting is currently not permissible. Unfortunately, instructional technology gadgets constrain us. So, I occasionally use Zoom or Google Meet to synchronise my lessons with my students.

Similarly, SACP, in vindication of what SACT-1 said earlier on, manifested that;

> Before COVID-19, in my usual supervisory duties during instruction, I realised that in recent times, almost all tutors use projectors and computers in their tuition to achieve higher productivity and efficiency, especially during the presentation stage of instruction. In this era of COVID-19, although the school's internet facility is not well-

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> developed, tutors sometimes find ways to engage their students in virtual instruction by navigating Google Classroom, WhatsApp, and Zoom on their accounts.

In similar circumstances, SJCP acknowledged that;

> In the current dispensation of teacher education, no meaningful class activity could be done without a computer, projector, and, in some circumstances, Wi-Fi internet connectivity since it is now the centre stage of academically impactful teaching and learning. This practice has become very significant and more pronounced by teachers in this era of the COVID-19 pandemic when teachers' and students' physical presence in class is impossible. In this instance, many instructions are always carried out online since school is temporarily on break.

SJCT-1, in agreement with SACT-2, confirmed that;

> The pandemic made me re-orient my lecture strategy in favour of online instructional tools such as LMS, Zoom, Google Meet, and Google Classroom for many class activities. So, the prevailing circumstance determines, to some extent, the instructional technology tool for my class activity.

BCP also reiterated that;

> The COVID-19 emergency presented a perfect and unprecedented opportunity for me to implement technology-oriented instruction in Social Studies at my college. As a result, tutors habitually use these technological online and virtual classroom tools in their lectures.

Similar soppiness was again proven by SJCT-2 when he said that;

> COVID-19 caused some of us to reorient our tutorial plans and processes towards online technology-imbued lectures. This has made me consistent with using Google and Google Classroom software, aside from the traditional face-to-face procedure with which we tutors were previously familiar. These technological tools have proven to be a feasible and dependable option in my synchronous and asynchronous instruction.

AFCT-1 said that

> I do not have a particular time to incorporate technology into instruction. During COVID-19, I wished the school had a Wi-Fi facility and other instructional technology tools to facilitate our instruction. However, inadequacy is our major enemy here. So, I hardly use instructional technology in this era of COVID-19 when school is not in session.

AFCT-2 stressed that

> I used to instruct using a computer without internet access. However, COVID-19 has changed the narrative, so I cannot use my personal

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> computer to engage the students from this distance to their homes with the view of sustaining instruction. Because there is no access to the internet, I do not use instructional technology, and I am virtually dormant in this period of school closure.

ACT-1 also confides that

> I wish to integrate technology into all my instruction regardless of the topic. Unfortunately, we are technology. (absence of Internet for academic work) handicapped in this period of COVID-19, where such services could have been of the essence.

ACT-2 as well submitted that

> Before COVID-19, when the topic to be treated demanded extra illustrations, I usually used a computer with prepared resource materials on slides. That aside, we do not have access to the internet for such instructions. That explains why some of us cannot engage our students in this era of COVID-19 with any meaningful distance instruction online.

AFCP did mention that

> Tutors do not incorporate technology the way they would have wished because we are resource handicapped. So, COVID-19 has not been a good experience for our tutors since the absence of the internet in our school has made that possible.

ACP also stated that

> We wish our tutors had been technology-inclined instructors, but that has not been the case. So, it is challenging to tell when our tutors use the available computers for instruction.

The submissions of SJCP, SACP, BCP, SJCT-1 and 2, BCT-1 and 2, and SACT-1 and 2 were a testament that technology in work processes is essential in the dispensation of instruction in the era of the COVID-19 pandemic. In this instance, the tutors tried to use instructional technology in their lessons, although not to capacity. However, they were privileged to access online instruction in their colleges during the COVID-19 pandemic. Relatively, regarding the views shared by ACP, AFCP, ACT-1, ACT-2, AFCT-1, and AFCT-2, the gap in technology utilisation in instruction at a given period of the tutors' instruction became quite evident as there was the absence of

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technology required for the work process to be buoyed during COVID-19. Hence, some tutors could not use technology at the time.

Some of these innovative online processes that transpired at the colleges of education in the investigation during the COVID-19 pandemic made it possible for tutors to explore other technological options available to self-tuition in Social Studies, considering facilitators' pedagogical and content demands. Hernandez (2021), contributing to a study on "Teaching Online in the Age of COVID-19", divulged that, fortunately, the development of the internet and the expansion of online teaching since the early 2000s have produced a wealth of pedagogical research that can help us adapt to this new reality and change our approaches to better suit this medium. This assertion by Hernandez constitutes an innovation diffusion, as spelt out by Rogers's (2003) IDT, due to TAA during the COVID-19 pandemic as various technological tools like Skype, Google Meet, Zoom, and Telegram were resorted to in instructional sustenance. Although studies have shown that virtual classes existed long before the advent of the COVID-19 pandemic, they assume higher proportions of utilisation in the era of COVID-19 in many educational institutions worldwide since there was no in-person meeting between the teacher and the students. Hernandez's submission buttresses Rogers's (2003) postulation on his innovation diffusion theory about how technological innovations spread throughout societies and cultures from instruction to widespread adaptation. "Thanks" to the advent of COVID-19, this technology-oriented school programme that got to an ascendancy imbibed in many a tutor the habit of integrating technological tools in their daily instructions. Equally, as a phenomenological study, the live-in experiences of a good number of the tutors made them empathise with their students and resolved to make online teaching the fulcrum of their instruction and as a way of sustaining the academic calendar that came under

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threat due to the pandemic Indeed, this study has confirmed the study conducted by Hernandez (2021), that a good number of teachers made it a practice of utilising educational technology in their instructional delivery, as they appreciated their ease of use and usefulness to their instructional cause as stipulated by Davis's (1989) TAM. Indeed, the range of technological tools tutors utilised during the COVID-19 pandemic was a testament to TA in the instructional delivery process.

It was concluded that teachers could utilise specific online instructional technology within their curriculum, depending on what they intended to achieve at a given time, but not necessarily for its own sake. This indicates that tutors should align online technology utilisation with the learning objectives at specific period. Hence, consideration should be given to what the tutors want to achieve and choose online technology tools that best support those goals.

Therefore, the views shared by the CT and CP participants show that the emergence of the COVID-19 pandemic proved to be a decisive factor as to why, even in the colleges of education where the technological facilities were absent, individual tutors made an effort to incorporate technology in the wake of COVID-19 to sustain instruction. However, Ghavifekr et al. (2012) postulated that restricted access to resources and inadequate technical support were among the reasons lecturers cannot incorporate ICT in their teaching process. So, the inaccessibility to technological resources in ACE and AFCE was also a source of denial and rejection for their tutors, who fall into the category of late adopters and laggards, respectively, in the use of low-grade technology and to some extent rejection as indicated by Rogers in his IDT. By implication, resource availability is of the essence in information transmission in the instructional process.

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4.2.6 Students' response to technology utilization in instruction

When the question of "the response of students to online technology usage in the tutor's lesson" was posed, the following responses were given;

SJCT-1 described that;

> Students' interest and participation in a technology-based lesson is more encouraging than one without technology integration. In this instance, the desire to know something new in their learning process usually stimulates them to participate in the lesson. This explains why, in this period of the pandemic, despite the problems of internet irregularity, students' participation in synchronous and asynchronous lessons is very encouraging.

SJCT-2 equally avers that;

> Although some teachers are unfamiliar with technology-incorporated lessons, their enthusiasm and assertiveness toward virtual instruction during COVID-19 are encouraging. Such a desirable atmosphere typically engenders fruitful exchanges in-class activities.

BCT-1 also proposed that;

> The COVID-19 pandemic has enlightened student-trainees on integrating technology in instruction. This incident shows the enormous influence of technology on students in lesson delivery.

BCT-2, in affirmation, stated that:

> Students love using technology in lesson delivery because it allows them to access images, videos, and other visuals with a projector, which otherwise would not have been possible. The pandemic necessitated technological innovation in instruction to bridge the gap between us as tutors and the students.

ACT-1 submitted that;

> Before the COVID-19 pandemic, technological proliferation in academia was not so widespread in our part of the globe. However, every tutor now wishes to utilise emerging technologically productive ways in virtual tutorials. This tells you how wishful tutors are to see their lessons conducted with technology regularly, especially during COVID-19. However, as stated earlier, my school lacks some devices to facilitate online instruction.

SACT-1 certified that;

> Students have been responsive in lessons that are information communication technology-oriented. However, due to some setbacks, we are often not well-off to utilise such facilities in the best way

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> possible. In this era of COVID-19, technology integration into lessons is the best option, as social distancing is in force.

SACT-2 equally claims that;

> Students are always eager to see tutors employ technology in their teaching. However, their aspirations are often unmet because we do not have modern devices, such as broadband services, to make such expectations possible. Therefore, we often make do with what is available, particularly during the SARS-CoV-2 pandemic, when face-to-face meetings are not feasible.

AFCT-1 and AFCT-2 reported that manipulating technology in one's instructional processes could benefit tutors and trainee teachers. However, we are very underprivileged regarding the technological tools needed to facilitate class activities regularly, especially in this era of COVID-19.

This was exemplified, for instance, by AFCT-1 as;

> Teaching with technology is very interesting and cherished by tutors and students. However, resource inadequacy makes such dreams and changes in our approach to instruction difficult to realise consistently as envisaged.

ACT-2 shared the notion that;

> Our school's limited capacity for technological resources has been the primary reason for some of us being unable to utilise technology in our teaching and learning activities. It has been a significant worry to some of us.

The CT participants' responses show that students' response to instructional technology was encouraging. The study discovered that the Social Studies approved technology-based teaching and learning during the COVID-19 pandemic trainee-teachers as characterised by the responses given by the CT participants in the study. This was buttressed by Zobeidi et al. (2023) when they submitted that the incidence of the COVID-19 pandemic enhanced tutors' utilisation of online instructional technology as students realised that was the possible way of sustaining instruction. Indeed, the pandemic was at its peak during this investigation. Consequently, tutors decided to resort to distance instruction. Associated with this view was Zobeidi et

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al.'s (2023) contention that online learning systems have become an applied solution for delivering educational content, especially in developing countries, since the start of the COVID-19 pandemic.

The CP participants in the study enunciated their views on students' response to technology integration into instruction.

SJCP remarked that;

> To my knowledge, tutors' incorporation of technology into lessons has always appealed to students. Meaningful interactions between them are the environment I often witness on my usual supervisory rounds as I peep through the windows at the lecture rooms to engulf myself in the activity underway.

BCP participants equally voiced that;

> Teaching and learning-friendly environments are exhibited when one form of educational technology or the other is incorporated into a Social Studies lesson's teaching and learning process as some other courses do. The hearty interactions between tutors and students manifest that the future of technology in academia is bright.

SACP did indicate that;

> Students' interest in technology-friendly instruction cannot be underestimated. Tutors commonly justify the need for the college to acquire teaching and learning technological tools for the school with the interest students show in lessons whenever the available tools are employed in the teaching and learning process.

The expression of AFCP was quite apart when he deposed that;

> Not having up-to-date facilities for academic work in our school did not hinder the students' desire and readiness to make technology an integral part of their learning process, thanks to their internet-compatible handsets, during face-to-face lessons. Their ability to complement the teacher's efforts indicates their enthusiasm for technology-backed lessons. Unfortunately, the COVID-19 pandemic did not permit this teaching and learning environment to be made possible, as a distance learning facility is unavailable in the college, which is very new.

ACP admitted that;

> Students are highly responsive to lessons that incorporate technology. This scenario encourages the learners to get involved in the lessons underway in class at any given time. However, we lack the desirable

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> technological facilities that aid this process, such as the internet, especially during the COVID-19 pandemic.

The responses from the CP and the CT participants undoubtedly show that students' involvement in Social Studies lessons incorporating educational technology is always commendable. Interestingly, TAM, from the viewpoint of Silva (2015), stipulates that behavioural desire to use a technology considerably precedes actual use.

It is pretty revealing that technology's influence on a tutor's instruction emanates from the enhanced benefits and support they receive before utilising the new technology. Therefore, support given to technology users is a critical ingredient needed to ensure its successful use in instruction.

4.3 Tutors' Perception of Learners' Reaction to their Online Technology in Pedagogy

This section is informed by Research Question 4, which focuses on tutors' perspectives on learners' reactions to online pedagogy. The interview guide items used to answer this question were: "How is technology in pedagogy understood by the CP and CT participants in the investigation?"

4.3.1.i Technology in pedagogy in the era of the COVID-19 pandemic

Subsequently, participants demonstrated their familiarity with "technology in pedagogy in the era of COVID-19" when individual participants within category CP came up with the following responses: SJCP informed that;

> The kind of technology the Social Studies tutor uses normally considers the students' level and cognitive development. In this era of the COVID-19 pandemic, virtual and web-based online instruction is the norm, as physical meetings in class are largely nonexistent. According to the tutors, students' regular and punctual class attendance, participation in assignments and group work online, and active participation in the tutors' online class activities attest to their competence in technology-based pedagogy.

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Participant BCP also conveyed that;

> Pedagogically, tutors are well-versed in the delivery modes and techniques to use at different levels. They are very familiar with the strategies to adopt to make their instruction successful. Regarding technological know-how, tutors occasionally participate in training programmes and workshops to learn how technology is utilised in lesson delivery. This helps them develop the skills required to use technology actively in an instructional situation.

SACP correspondingly divulged that;

> Technology in tutors' pedagogy in the era of COVID-19 refers to how tutors incorporate technology into their tuition at a given period. This practice has always been pivotal in the entire class activity. Tutors are familiar with employing a standardised set of software, such as word processing on computers, in their lesson presentations through Zoom video conferencing during this pandemic era.

Participant ACP equally conveys that;

> Tutors' technological, pedagogical, and content knowledge cannot be underestimated. A case in point here is the incidence of COVID-19, which virtually brought the entire world's educational programmes to a halt. This is where the ingenuity of college tutors regarding technology integration and varied pedagogical practices is brought to bear in the instructional processes. Some of the tutors, on their own initiative, engaged the learners in distance learning through Telegram and WhatsApp meetings to keep instruction alive.

AFCP stated that;

> Tutors' technological and pedagogical knowledge is quite remarkable. However, the college is still struggling with incorporating modern technological gadgets to expose tutors and students to high-standard teaching and learning processes through technology. Individual tutors, with the help of their own devices, sometimes use WhatsApp, Telegram, and sometimes Zoom to teach the key concepts.

The responses given by most participants in the CP category show that students approve of "technology in pedagogy", and, as such, tutors have also made it the fulcrum of instruction at the five colleges of education in the study. Although it became apparent that not all colleges were equipped with the necessary technological gadgets to facilitate technology utilisation, some tutors, through their efforts to provide some of the devices, were able to, at certain times, successfully make technology the centrepiece of their lessons. Hence, Mishra and Kohler (2006) rightly

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state that technological knowledge is related to one's ability to understand the functioning processes, computer hardware, and the capability to use standard software tools, such as word processors, browsers, and email, in a teaching and learning environment. Mishra and Kohler's assertion aligns with the responses provided by the CP participants in the study.

Contributing to the discourse, La Velle et al. (2020) declare that without prior experience in emergency remote teaching (ERT), many teachers were hindered by insufficient technological skills, a deficiency in incorporating technology in a remote context, and inadequate digital infrastructure in colleges. Indeed, technology in pedagogy characterised the nature of instruction during the COVID-19 pandemic. Despite the odds, the study's college tutors' assertiveness in using technology in the ERT made their responses significantly more impactful compared to their South Korean counterparts, despite their lack of experience in emergencies, similar to their Korean counterparts.

Indeed, the discourse on technology in pedagogy during the COVID-19 pandemic shows that a tutor's ability to sustain instruction during the emergency was mainly attributed to their technical knowledge of pedagogical practices that facilitate technology use.

Furthermore, when views were solicited from the CT participants on their technological, pedagogical, and content knowledge, they had this to say: SJCT-1 specified that;

> I do not have a problem with technology in pedagogy. Through my training as a professional teacher, I have learned how to infuse technology into the pedagogical process. These concepts are always central to my lessons, and student teachers enjoy them so much.

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SJCT-2 equally shared a similar view when he disclosed that;

> Throughout, technology and pedagogy have been integral to my day-to-day lessons. These concepts are inseparable components if any meaningful lesson is to be conducted. My knowledge of how to piece these concepts together in a lesson was particularly helpful during the COVID-19 pandemic. The sustenance of lesson delivery would have been quite impossible for me if knowledge of technology in pedagogy were lacking.

BCT-1 consistently answered that.

> Technology in pedagogy implies integrating facilities like PowerPoint, the Internet, and LMS into class activities. Aside from the ease of lesson facilitation, students' interest in such lessons makes it very cogent to use technology in pedagogy, as is the case with Social Studies.

BCT-2, too, retorted that;

> Applying technology in pedagogy is a teaching and learning situation in which technological tools are integral to the delivery process, maximising students' participation and understanding of the lesson.

SACT-1 claimed that;

> A teaching process in which technological tools, such as YouTube videos and other visual illustrations, are projected on a screen to help students understand concepts may be conveniently referred to as "technology in pedagogy." That is what I can say on that note.

SACT-2 also thought that;

> Technology in pedagogy connotes the idea that teaching and learning are conducted in an environment where some tools and devices capable of enhancing the transfer of information from the tutor to the student-teachers are embedded in the delivery of the lesson.

ACT-1 did manifest that;

> Suppose a tutor in the instructional process decides to use any gadget, tool, or equipment to boost his class lesson. In that case, one can suitably say that pedagogy technology is key to the activity.

Participant ACT-2 also stipulated that;

> The application of modern tools and equipment in instruction to improve student performance is often referred to as technology in pedagogy. So, if I am privileged to use PowerPoint in my lesson presentations, I can confidently say that technology in pedagogy is utilised.

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In the same vein, AFCT-1 agreed that;

> Making tools like computers and other related components an integral part of lesson delivery is prudent. However, my school lacks sufficient facilities to make lesson delivery enjoyable in a teaching and learning environment. However, at certain times, if necessary, my mobile phone, aided by WhatsApp, Telegram, and Zoom technological tools, is used to aid my lesson presentation in this era of the COVID-19 pandemic at my own cost to "data".

AFCT-2 similarly opined that;

> Every teacher, regardless of the level they teach, wishes to make computer technology central to the instructional process. However, not everyone can access such facilities to ensure this expectation is met. Irrefutably, the immense contribution of technology in instruction is undeniable, particularly for us in academia. I rarely used WhatsApp to reach my students during instruction in the COVID-19 pandemic.

It was interesting to note that the participants in category CT were very informed about the issue of technology in pedagogy at the colleges where the study took place. In this regard, the responses given by CP and CT participants affirm Brandt's (2001, p. 74) argument that "a technologically fluent person must be able to understand technology broadly enough to apply it to everyday usage and recognise when information technology can assist or impede in the achievement of a goal". Brandt's assumption is also a further endorsement of Davis's (1989) TAM. Therefore, teacher educators should demonstrate modern knowledge and enable them to understand how new inventions can support learners to meet the required curriculum standards (Okojie & Olinzock, 2006). Additionally, Bonifaz and Zucker (2004) supported Brandt's assertion by arguing that it is easier for a teacher with an educational technology background to select the appropriate technology by differentiating instructional technological needs according to students' needs and cognitive development.

This shows that, indeed, instructors of Social Studies at the colleges of education took much cognisance of the COVID-19 pandemic at the time of the investigation and the

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cognition of the learners before consideration was made on the choice of technology, methods, techniques, and strategies to be used in the transmission of knowledge during virtual lessons. Hence, tutors became more conversant with the process and continue to make technology in pedagogy an essential component of their lessons in the event of the COVID-19 pandemic.

The conclusion was that the tutors' technological know-how influenced their pedagogical practices and content delivery. This enabled them to utilise online instructional technology in the presence of the COVID-19 pandemic. This highlights the importance of providing tutors with training and support to develop their technological skills, which can, in yurn, enhance the quality of instructional delivery.

4.3.1.ii Tutors' exhibition of competence in instructional technology

When an inquiry was made on the "instructional technology that Social Studies tutors have adequate knowledge in", the following responses were given by the CP and CT participants, respectively:

SJCP certified that;

> Much of the class activities conducted by the Social Studies tutors before the emergence of COVID-19 involved projectors and computers. Nonetheless, COVID-19 did not hinder the use of these gadgets; instead, it provided a springboard for effective teaching in virtual instruction with the aid of an internet connection. LMS and Google Meet, which offer limitless opportunities for instruction, are also often used by tutors in their online lessons with students.

BCP also postulated that;

> Although tutors are trained in some of their workshop programmes on emerging trends in teaching and learning, I must say that there has not been specific training on how to incorporate technology into instruction. It is hoped that they will apply what they have learned in their formal studies in some of their instructions in the interest of the teacher-trainees.

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SACP too, retorts that;

> Tutors have their respective choices when it comes to technology applications in instruction. Specifically, it may be challenging to identify a particular technology that Social Studies tutors utilise in their lessons. Although our college faces some challenges regarding the utilisation of technology in instruction, some tutors are very industrious and, as such, can acquire their own devices to enhance their lessons depending on their goals at the time.

Participant ACP, too, declared that;

> The fundamental technological tools that rightly come to mind for Social Studies are the projector and tutors' laptops. Some of them prepared their lessons using slides projected on the screen during class interactions before the COVID-19 pandemic. However, the advent of COVID-19 has witnessed tutors' ingenuity in sustaining academic work through the WhatsApp communication tool. That is probably what I can say about this matter.

AFCP, much the same way, disclosed that;

> Some tutors sometimes use the data on their phones and laptops to engage students in instruction. The college aspires to acquire facilities that will spare tutors and students the stress they must endure to engage in academically rewarding discussions on a particular theme. Some of the tutors informed me that, although the school is technologically insufficient, they have managed to use Telegram, WhatsApp, and Google Classroom from their tablets to engage students during the COVID-19 pandemic, when the school is temporarily closed.

Although the data from the CP participants revealed that tutors are familiar with one form of computer technology or another, not all of them employed LMS, Zoom, Google Meet, and WhatsApp in their instructional delivery during the COVID-19 pandemic. Those tutors who indicated their inability to engage their learners in these internet-based educational tools attributed it to the inaccessibility of the internet in their college. According to them, this situation made it impossible to use and adapt to the benefits it presents in their lesson presentation. Even though those tutors who were unable to apply technology in instruction have at least some background knowledge in the application of computer technology, their failure to adopt it shows rejection of the innovation in question, as indicated by Rogers's IDT. Fundamentally, the domains

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where technology application in lesson delivery was observed in the study included tabletop computers, laptops, and other smart devices. In effect, Means (2010) contends that despite decades of national, state, and local promotion of educational technology, classroom practices in most schools have changed little from those of the mid-20th century, clearly supporting the positive impacts of adapting to technology in teaching.

In relation, views obtained from the CT participants were as follows;

SJCT-1 posits that;

> Much of my instruction is now done with my laptop, computer, and projector. I am fortunate that my college has an internet facility. So, sometimes, class assignments, quizzes, exercises, short tests, and project work are done on the web with the aid of education-friendly software such as LMS, Google Meet, Google Classroom, Zoom, and WhatsApp to enhance delivery, especially in this era of COVID-19.

SJCT-2 likewise maintained that;

> I use my tablet for almost all the tuition, assignments, quizzes, and short class tests by projecting these activities on a screen. In some cases, references are made on the web since the college is privileged with internet access. COVID-19 is one central instance that helped me sharpen my knowledge and use of these instructional facilities, as physical meetings between me and the students are not permissible.

BCT-1 specified that;

> In instances like COVID-19, face-to-face is impossible for me due to the school's temporary break. My knowledge of various educational software applications available on the Internet, such as Learning management systems, Google Meet, and WhatsApp, provides me with options to choose from to engage my students both synchronously and asynchronously. This period of the COVID-19 pandemic has given me a basic understanding of manipulating Zoom video technology, which has proven to be a valuable interaction tool.

BCT-2 endorsed the view that;

> In my virtual online lessons, I implement modern-day educational dispensation, such as computer technology. I have become very familiar with the operation of these facilities to the extent that I cannot perform any activity in this era of the COVID-19 pandemic without them.

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Participant SACT-1 also certified that;

> I always wish to use Google Meet technology to facilitate my instruction. However, during this pandemic, poor internet accessibility in the school is not helping me sustain virtual lessons outside the four walls of the classroom.

SACT-2 avowed that;

> Although I am trained to use LMS, Zoom, and Skype for online teaching, my school lacks reliable internet accessibility. Before the COVID-19 pandemic, I was unable to apply my knowledge to help my students. However, I have now acquired data on my laptop to engage my students in virtual lessons via Zoom and Google Meet during the COVID-19 pandemic.

ACT-1 also avers that;

> In frank terms, I have been trained to incorporate technology in my Social Studies class. However, the technological tools required to help me put what I have learned into practice are grossly inadequate in my college. Therefore, I have no choice but to resort to my markerboard and, occasionally, my smartphone for information during lesson delivery.

ACT-2 mentioned that;

> If I am to go by your question, I must say that I am knowledgeable about using LMS, Zoom, and Skype in lesson presentations. However, I cannot use them because the college does not have internet access, making it impossible for me to make such a dream a reality in my class activity during COVID-19, when the school is on a temporary break. I am now virtually inactive.

AFCT-1 participant also expressed that;

> I do know how to incorporate web-based instructional technology like Zoom and Skype. However, the college's resource handicap prevents me from applying such knowledge to my lesson presentation. So, the usual traditional markerboard before COVID-19. However, now, it is impossible to do so.

AFCT-2 likewise suggested that;

> I know how to incorporate Zoom and Google Classroom in a lesson. However, the internet facility is unavailable at AFCE.

Indeed, some of the CT participants indicated in their responses that they employ their laptops, tablets, and smartphones in their bid to link up their lessons via Zoom, LMS, and Google Meet on the internet to sustain their instruction in their effort to conform

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to the COVID-19 protocol of social distancing. Therefore, the views shared by the CP and CT participants collaborated well with TAM, which is founded on the theory of reasoned action (TRA), which theorises that societal behaviour is inspired by a specific attitude intended to envisage technological system usage (Lin, 2007). Again, the suggestion put forward by King and He (2006) indicates that the TAM, which is simple and easy to comprehend in its usage in a productive process, was one of the motives for its extensive usage. Through this process, the tutors can get the students into active instructional interaction. Indeed, the application of web-based technologies for the sustenance of instruction, as claimed by the CP and CT participants, connotes that many college tutors were abreast with some form of technology in their information transmission during the pandemic.

Therefore, it was established that tutors exhibited adequate knowledge of technology utilisation in pedagogy during the COVID-19 pandemic. Consequently, if they are encouraged to sustain their usage, tutors could become more effective in technology innovation and adaptation in instruction, even beyond the COVID-19 era.

4.3.1.iii Tutors' utilisation of technology, content, and methods

Again, the question of "how a tutor exhibits adequate knowledge in the utilisation of technology, content, and teaching methods in an instructional scenario during the COVID-19 emergency was expressed by the category CP and CT participants as follows;

The SJCP thought that;

> Tutors are responsible for guiding and directing students on a wide range of activities related to information sources during their studies, taking into account the use of appropriate technology, methods, and techniques at a given time. It is encouraging that tutors have adequate knowledge of integrating technology, pedagogy, content, and techniques in their instruction during the COVID-19 pandemic.

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BCP proposed that;

> Tutors integrate technology, pedagogy, and content in some of their lessons during this emergency period. Key concepts like environmental degradation are often demonstrated with technological devices and projected on a screen in their Zoom lessons. Such YouTube demonstrations help develop students' interest and motivate them to participate in the instruction.

SACP shared the opinion that;

> Tutors are always willing to demonstrate their knowledge of integrating technology, pedagogy, and content in their lectures. However, a lack of resources restricts them from using projectors and computers in instruction, where key concepts are usually projected onto a screen and further discussed. This era of COVID-19 could have been a good moment for them.

ACP also talked about the fact that;

> Tutors can interweave technology, pedagogy, and content in their delivery as they engage students in the respective learning units. However, learners are sometimes asked to look for information on their smartphones and complete projects for presentation. Tutors also supplement these efforts by the students with the projectors and computers provided by the college. Before COVID-19, only computers, projectors, and screens were used when in-person was permitted.

AFCP too, admitted that;

> There is no dispute that tutors have had some training in technology application in instruction over the short period of the college's existence. However, the absence of technological resources hinders the effective integration of technology, pedagogy, and content in their daily instructional activities, especially during the COVID-19 pandemic.

The category CT participants, in this instance, voiced out their views on this matter as

follows: SJCT-1 stipulated that;

> My knowledge of technology integration in pedagogy and the subject matter has made my instructional activities in this period of the COVID-19 pandemic very easy. Students are made to undertake their class activities with the help of LMS, Zoom, or Google Classroom because these technological tools offer endless opportunities in our instruction. For instance, plagiarism in their project work is checked with LMS tools on the internet.

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SJCT-2 equally avers that;

> Various educational technology-friendly software helps me select the appropriate pedagogical method and techniques, including student fieldwork. In so doing, I have learned to utilise technology, pedagogy, and content effectively in my lesson delivery. The COVID-19 pandemic is helping me sharpen my technical knowledge in this area of my teaching career, as almost all of my lessons are online. So, I use what I call "the trinity in instructional delivery" (technology, pedagogy, and content) in my lessons with a technological tool as a transmission medium.

BCT-1, in his response, shared the view that;

> As teaching and learning are now more learner-centred, students are often tasked with exploring educational technologies available on the internet to undertake the various tasks in their course outlines under my supervision. LMS and Zoom are often used in my instruction to ensure that delivery is made during this period of the pandemic

BCT-2 correspondingly espoused that;

> Occasionally, I use Zoom technology in my lesson presentations to help me achieve my objectives at the end of the lesson. Most of my tutorial activities are prepared on slides. So, with the help of a laptop, projector, and the Internet, the necessary discussions and explanations get underway. Students feel more comfortable with my PowerPoint presentation on Zoom video than the extensive traditional markerboard work that was the only option in the pre-COVID-19 era.

SACT-1 conveyed that;

> Present educational dispensation is incomplete without technology utilisation. Although my school is technologically handicapped, I usually do all I can to devise ways to make up for this shortfall and make technology the centrepiece of my lessons. I select some instructional units and incorporate them on Zoom to facilitate my lessons. In some situations, Google Meet is accessed on my handheld touchscreen computer for online classes. It has helped me to fill the temporal yawning gap created by school closure due to the COVID-19 pandemic.

Participant SACT-2 claimed that;

> My adequate knowledge of technology applications is stifled by resource inadequacy. As stated earlier, I am willing and eager to incorporate technology into my teaching. However, I am unable to access the necessary tools, including internet access, to make it possible.

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ACT-1, AFCT-1, AFCT-2, and ACT-2 alike stated that their know-how in technology, pedagogy, and content integration in instruction cannot be underestimated. In this regard, it cannot be said there was a complete rejection of innovation as postulated by Rogers's IDT due to the tutor's inaccessibility to the web, which could have offered them several options for innovation incorporation into their pedagogical processes. This situation made them very handicapped during the COVID-19 pandemic. For instance, ACT-2 echoed their views this way;

> Much of our class activity and other illustrations were done on the markerboard before the COVID-19 pandemic erupted in Ghana, since we did not have access to the web. Although individual students supplement our lessons with a search on their smartphones, that is not enough to optimally utilise what we have learned about incorporating technology into instruction. So, this time of COVID-19 is practically not witnessing any consistent usage of educationally friendly technologies like Zoom and LMS.

The common observation made among the CP and CT participants in the study concerning how tutors exhibit their knowledge in technology, pedagogy, and content integration was that tutors who were privileged with web-based educational technology tools and equipment habitually integrated them into their lessons as needed. As a methodological process, the views expressed by some of the CT category participants agree with Yi's (2022) citation of Mishra and Koehler (2006) that for effective integration of technology and hands-on instruction, it is essential to achieve technological pedagogical content knowledge, a conjectured knowledge that emerges as teachers try to utilise technology in pedagogy. However, some of the tutors in the investigation who were unable to effectively demonstrate their knowledge in technology, pedagogy, and content usage as expected attributed this to resource inadequacy.

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Chai et al. (2010) assume that faculty in academia need to know the content and consider the changes in the discipline's content as technology is applied in instructional processes. Hence, the tutors' ability to acquire technological content knowledge must be channelled to suit Chai et al.'s supposition.

In sum, tutors' exhibition of knowledge of technology, content, and methods in their efforts to sustain instruction during an emergency can be made possible in an instance where power, up-to-date computers, and compatible software are available and accessible.

4.3.1.iv Incorporating techniques with content

Moreover, "the instructional techniques used when technology and content are combined in the lesson" revealed the subsequent views:

SJCP thought that;

> Tutors utilise discussion, lectures, and fieldwork to collaborate virtually in their instruction during the COVID-19 era. Students are expected to be taught in the event of the COVID-19 pandemic. However, this is not possible with in-person interaction. With an internet facility at their disposal, tutors are now permitted to interact with their students through distance tuition as they explore collaborative and virtual learning options.

BCP also claimed that;

> Individual and group presentations are among the instructional techniques tutors use in virtual classes. Some teachers resort to internet-based digital or electronic instruction during the COVID-19 pandemic when schools are closed due to temporary recesses.

SACP divulged that;

> Some tutors use discussion and brainstorming to facilitate their lessons. Sometimes, virtual teaching on the internet, aided by tutors' technological gadgets and handsets, also serves as an option for executing instruction in a virtual class due to COVID-19, which currently bars physical interaction between tutors and students.

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Participant ACP also reported that;

> Tutorials, project work, and class discussions are often used when technology and content are combined in a tutor's class activity. Post-COVID-19 instruction has often been characterised by the techniques stated.

AFCP said;

> When technology and content are combined in my lesson delivery, I am often comfortable with discussion and brainstorming techniques. These techniques allow my students and me to engage interactively throughout the lessons.

Submitting their views, the category CT participants in the study voiced the following opinions:

SJCT-1 remarked that;

> The combination of technology and content in an instructional environment requires discussion, demonstration, and, to some extent, individual and group presentations. Students accordingly become conversant with how technology is used in their instruction. Subsequently, this will enable them to replicate it when they assume responsibility as qualified teachers.

SJCT-2, in like manner, admitted that;

> Technology and content are bedfellows in modern-day educational dispensation. Hence, student-centred instructional techniques like demonstration, class presentation, and discussion are commonly used to expose students to how technology is used with content in instruction to improve efficiency. The pandemic presents a good opportunity for these techniques to be used for instruction.

Participant BCT-1, too, uttered that;

> My instruction mainly includes trainee-teacher-friendly techniques, such as field trips and individual and group presentations. Asynchronous activity is usually performed with the support of technology. Therefore, students can take virtual educational trips online to research a theme and present their findings.

BCT-2 verbally agreed that;

> Students are more motivated to participate in class activities when their interests align with the processes involved in the class. As such, I strive to incorporate brainstorming, project presentations, and discussions into my lesson delivery in this era of COVID-19.

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SACT-1 equally attested that;

> I am very comfortable using discussion, demonstrations, and project presentations when my lessons are technology- and content-based. The simple reason is that it immerses the student-trainees in the instructional process. Although we do not meet face-to-face due to COVID-19, it is the most preferred procedure.

SACT-2, from his standpoint, stated that;

> The paradigm shift in instructional delivery favours the learner. As a result, techniques such as virtual field trips using smartphones, class presentations, and plenary discussions form the basis of instruction. The COVID-19 pandemic has been a catalyst for change in lesson delivery, as physical interaction is temporarily prohibited.

ACT-1 stated that;

> My lessons prefer more discussion and student presentations to familiarise students with how instruction is conducted, even in this era of COVID-19.

ACT-2 also conveyed that;

> Student teachers undertake a significant portion of our work. This is done to familiarise the trainee teachers with the demands of their work in the instructional dispensation. COVID-19 has changed the dynamics, and the teacher has again taken centre stage to direct instruction.

AFCT-1 explains that;

> Lessons are often conducted using discussion techniques. Sometimes, students are given a task to prepare for a presentation using our data on online accessibility during this pandemic period. These activities are usually vetted, and marks are awarded using Google Classroom, with handheld tablets and students' smartphones used in a complementary manner.

AFCT-2 spells out that;

> My instructions typically involve discussions, lectures, and group presentations. Usually, I present a task and solicit views from students, who sometimes consult their phones to provide input. In some instances, I also posed a problem and asked them to prepare a group presentation for the subsequent lessons. However, we are now handicapped due to the absence of internet in schools, and subsequent school closures have been made possible by the COVID-19 pandemic.

The responses given by the participants in categories CP and CT on instructional techniques as technology and content are combined in a class activity demonstrate

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that tutors do employ a series of techniques, such as field trips, project presentations, and discussions, as they try to integrate technology and content in their instruction. This suggests that technology utilisation in lessons during the COVID-19 pandemic cannot be underestimated. It was noted from the CP and CT participants in the investigation that tutors use technology by resorting to their handheld gadgets with the compliments of students' smartphones and other handheld touchscreen computers to interact with their students, with selected techniques at a given period. This aligns well with Jain (2021), that colleges have created a forum-like platform wherein the teachers and students can interact on a 24x7 basis to solve academic problems and disseminate related important information that agrees with the submissions made by the student teachers in the study. Jain again mentioned that educators' ability to upload content to the LMS, which students can view at their convenience, is a mark of good teaching technique, as endorsed by the participants in the study. He further stressed that LMS, an application software used to design, execute, and evaluate a given instructional activity, is a mark of progress in information transmission, especially during the COVID-19 emergency. Hence, the LMS provides the teacher with a method to fashion out and deliver the subject matter, oversee learners' involvement, and evaluate their performance during the COVID-19 pandemic technology acceptance (TA) as prescribed by the TAM. Even after the COVID-19 pandemic recession, Jain's assertion may still be pervasive in some colleges of education in the study.

A conclusion was drawn that virtual and online field trips, discussions, lectures, and presentations characterised some techniques tutors employed as they combined technology with content in their virtual online instruction during the COVID-19 pandemic era. Therefore, the online instructional methods, techniques, and strategies

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used can provide flexibility and accessibility for students, and the experiences gained during the pandemic can inform future teaching practices by highlighting the potential benefits of online technology-influenced instruction in times of crisis.

4.3.1.v Specific content tutors extract the topics

On the issue of "specific kind of content taught and technology used," participant SJCP stated that;

> Although I am not in the classroom directly, when Social Studies tutors begin with a specific topic like "citizenship", a YouTube presentation on the historical background of the topic and pictograms of what qualifies one to be a citizen of a sovereign entity are used by teachers to help achieve the set objective(s) at a given period, including this era of COVID-19 pandemic.

BCP also suggested that;

> In our daily observations, student-teacher participation in such lessons becomes very interesting, as learning becomes very realistic when images and practical situations are mirrored to them through the PowerPoint presentations by tutors during instruction. I have not noticed specific activities they perform with the students with specific technology in mind. In this era of COVID-19, however, tutors' approaches and the utilisation of technology in content are dictated by the demands of the time.

SACP mentioned that;

> Sometimes, during my usual rounds, I witness tutors, regardless of the topic they are teaching, utilising one form of modern technology or another to make their lessons more vibrant and realistic, before the advent of COVID-19. However, during the COVID-19 pandemic, internet and other broadband facilities are lacking in schools. However, some tutors use technology to engage the students in online instruction.

ACP also says that;

> Indeed, I have not taken special notice of the specific technology tutors use to facilitate specific content at a time. All I am aware of is that, at certain times, they do use technology in their instruction.

AFCP equally suggested that;

> Due to our resource deficit, I have not observed teachers engaging their learners with specific technology related to specific subjects in their Social Studies classes. As a relatively under-resourced religious educational institution, we are not yet fully equipped. However, I know

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> some tutors have ways and means of utilising technology with content. However, I have not noticed whether they do so for specific topics related to specific technologies.

Some of the responses from the CP participants indicate that tutors select technology that aligns with a specific topic, but not every topic for which a particular technology was used in their instruction at a given time. However, a smaller number of participants, such as AFCP, could not demonstrate whether their Social Studies tutors use a particular technology with a specific theme in their lessons due to resource constraints. The responses given by the participants align with Shah's (2021) assumption that for technological tools to impact a lesson, they must be appropriately utilised and purposefully. It was observed from the responses that, regardless of whether the college was fully equipped with educational technology facilities, some form of modern technology was used in lesson delivery at certain times during the pandemic. In any case, there was a TA of a sort in instructional delivery, going by the participants' responses.

In effect, the online instructional procedure used by the tutors during the COVID-19 pandemic proved to be the most sustainable cause of PU of technology in the instructional context; this shows that every content in the curriculum of Social Studies can well suit specific technological tools to make the lesson more comprehensive to avoid misrepresentation and misinterpretation of the actual meaning of certain key concepts in the instructional process. Subsequently, the CT participants had the following to share on the issue;

SJCT-1 came out that;

> In my view, all curriculum topics require one form of technology use or another if all ability groups in the instructional environment are to be adequately catered for. So, the specific kind of content taught and the technological mediums used for academically gifted, intermediate learners, and academically underperforming students help bring them to an appreciable level of performance.

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SJCT-2 said nothing different when he voiced out that;

> Suppose my lesson is to achieve a set target. In that case, specific topics are usually treated using appropriate technologies to help me bring out the best performance from my students, as each of them comes with their own ability levels. For instance, the projection of a YouTube simulation on the topic of "Environmental Degradation" is one such situation that helps bring meaning effectively into the lesson, as students' interest and curiosity are generated.

BCT-1 deposed that;

> The teacher training college curriculum has recently been revised to incorporate technology integration as an integral part of all topics outlined in the course. Students' technological obsession makes it easier for instruction to be carried out, as almost every lesson is adapted to one form of technology or another during this period of COVID-19.

BCT-2 also disclosed that;

> Lessons, irrespective of the topic, in this COVID-19 pandemic period require some technology to bridge the school closure gap. It has been observed that students are relatively patronised by online class activities.

SACT-1 equally contends that;

> Lessons that utilise the appropriate technology can engage the entire class in the tutorial journey, making it very easy for students to understand the significant concepts. In this instance, I require little effort to transmit knowledge. Almost every lesson requires the utilisation of technology due to its benefits to instruction.

SACT-2 evinced that.

> Ideally, I wish to incorporate technology into all my lessons due to its potential contributions to information processing and transmission. However, at certain times, the appropriate technology for the specific topic I have to teach is unavailable or inaccessible.

ACT-1 notified that;

> Instruction as an art is well done when all the necessary ingredients are available to bring the pieces together and make them more presentable. So, I utilise technology for my lessons as and when it is accessible without consideration of a specific topic. However, the COVID-19 pandemic has brought a different dimension to technology usage in instruction. Our school is, in a way, handicapped with broadband access for academic work. So, I am unable to engage the students in consistent online instruction.

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ACT-2 did confer that;

> Projectors and computers have become the most widely used information and communication gadgets for teachers and students in many educational institutions. In our case, technological tools such as WhatsApp and Telegram are sometimes relied upon. Preferably, that could have been the case, but the scarcity of resources at my college made it difficult for us to do so.

AFCT-1 and AFCT-2 shared similar assertions when they opined that almost all their lessons are taught with a chalkboard. For instance, AFCT-2 stated it this way;

> I aim to incorporate technology into all the topics I teach in my class. However, this has been impossible, for instance, during the COVID-19 period, when I was unable to meet my students physically. This is one instance where, if the college were endowed with instructional technology tools, teaching specific topics using specific technology could have been remarkable. Therefore, I can hardly articulate the specific type of content taught and the technology used, as the traditional chalkboard method was the most commonly used for almost all my content during the pre-COVID-19 period.

In all, many responses from the CP and CT participants affirm that technology is not used for its own sake, but rather for specific content. However, for the purpose and objective, the tutor intends to achieve during the COVID-19 pandemic. Most of the CT participants revealed that it is essential to carefully select the technology that best suits the content the tutor wants to teach at a given time, especially if individual differences or ability groups in the classroom are well catered for. Their contention aligns with Kurt's (2019) submission that the "technology in pedagogy" concept requires definite technological tools related to instruction to facilitate students' comprehension of more difficult content. It is also not astounding when Schmidt et al. (2009) indicated that technological content knowledge relates to how new ideas can create new depictions of particular subject matter at a given time in the instructional process to aid ability groups. These assertions made by these authors buttress the important role technology plays in instructional delivery at a given period. Notably, the COVID-19 pandemic presented an opportune moment for incorporating

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technological tools into instruction. Nonetheless, the participants' views equally agree with Kurt (2007), Schmidt et al. (2009), Dunleavy et al. (2007), and Waddoups et al. (2004), who claim that innovation gives instructors the capacity to modify instructional resources and charges to find solutions to students' educational needs directly; offer suggestions on how to access authentic resources to enhance their lesson delivery; and avail additional sources of information for their students to rely on in an instructional environment. In his contribution, Hassell (2002) argues that IT poses no threat to the instructional environment and enables students to cater to their individual abilities and unique needs. Indeed, the CT participants' opinions shared were again in consonance with Hassell's postulation. Indeed, the tutors resolved to adapt their instruction to technology to help overcome the yawning gap created by the temporary school closure during the COVID-19 pandemic. The tutors were also expected to make selecting and using specific technology for specific content a matter of concern, addressing the demands of each topic at a time, effectively.

In sum, the incidence of emergencies can influence how technology is used in specific instructional activities, rather than merely selecting technology for its own sake. By implication, emergencies such as the COVID-19 pandemic can drive innovative uses of technology in the Social Studies discipline in teacher education, shifting the focus from mere technology adoption to purposeful utilisation in instructional activities.

4.3.I.vi Pedagogical training of tutors during and after their formal training

Equally, a core concern of this investigation section was "the probe into the pedagogical training of Social Studies tutors during and after their formal education". In this regard, participants gave varying inputs in the categories of PC and CT.

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Initially, the CP participants shared their standpoints, to be immediately followed by the viewpoints of their subordinate CT participants in the subsequent discourse:

SJCP notified that;

> Tutors receive pedagogical training on the basic instructional methods, techniques, and skills required to facilitate information transmission in the classroom as part of their formal training as professional teachers.

BCP also mentioned that;

> Every college tutor must have the pedagogical skills required to function as a teacher. However, changing educational trends have necessitated that tutors occasionally attend workshops and training programmes to update their knowledge and skills as career professionals.

SACP too professed that;

> All college tutors must have a pedagogical background as a professional requirement since that is the foundation of their profession. However, continuously changing pedagogical processes have led to the institution of further career development programmes in all colleges of education, which have been ongoing for some time now, courtesy of T-TEL and GTEC.

ACP posits that;

> Pedagogy is the professional teachers' methodological toolkit that enables every teacher to carry out the instructional duties assigned to them as dutifully as expected. From time to time, tutors are required to update their pedagogical knowledge, as is currently being implemented in the colleges of education under the auspices of GTEC and T-TEL. The tutors in their respective disciplines attend other pedagogical training programmes and workshops to specifically equip them with some of the emerging pedagogical trends in their discipline.

AFCP equally specified that;

> Pedagogically, all the tutors in the college have had one form of training or another as part of their formal training before their respective degrees and programmes they pursued were handed over to them. After some years in the service, the tutors are refreshed with other methodological approaches not taught them during their formal training. Alternatively, they have become obsolete.

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The CT participants also echoed their respective views as follows:

SJCT-1 puts forth that;

> Although I have had some level of training in pedagogy during my formal training, professional Development re-training programmes in pedagogy continued to be part and parcel of colleges of education PD programmes. The career development programme on T-TEL has been ongoing in all the colleges of education in Ghana since 2017, and there is no definite date for its completion since it has now come to be part of college PD programmes undertaken every Wednesday of the week when school is in session. Interestingly, unlike the on-the-job training pedagogical programme, my first formal training did not emphasise digital application processes.

SJCT-2 declared that;

> Having successfully completed and passed my first-degree certificate programme in Social Studies Education, I have fully grasped and refined the pedagogical methods and principles that I can now utilise as part of my repertoire of instructional delivery tools. However, it did not end there. As we speak, PD programmes on digital pedagogy and other related programmes where technology takes centre stage in instruction are being instituted for tutors. Unfortunately, COVID-19 has affected the physical attendance of the programme for some time now.

BCT-1 also mentioned that;

> My certificate in pedagogy, part of my university's first degree, primarily focused on methods, techniques, and strategies for instruction. This notwithstanding, retraining in pedagogy to update tutors in our designated areas of specialisation has been ongoing as part of our career development, with support from T-TEL on our college campus, and some of our colleagues serving as facilitators.

BCT-2 divulged that;

> I am a professionally trained teacher, so I am familiar with pedagogical know-how in Social Studies instruction. Therefore, I developed digital pedagogical tutoring, which effectively equipped me with the necessary skills to integrate technology into my instruction pedagogically. However, until the advent of T-TEL and G-TEC in the pedagogical PD semester-based programme, I did not have any tutoring in pedagogy after my first-degree programme.

SACT-1 did share that.

> My formal pedagogical tutoring was dominated by lectures, discussions, demonstrations, brainstorming sessions, and project presentations, all of which were devoid of digital applications. However, the 2017 pedagogical tutoring instituted by the United Kingdom Overseas Development Agency (UKODA) in the outfit of T-

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> TEL in conjunction with GTEC to re-train tutors on the PD programme for colleges of education on a semester basis exposed me to technologically-motivated pedagogy where no instruction could be done without one form of modern technology or the other in use.

SACT-2 also added that;

> My initial pedagogical tutoring witnessed the use of more traditional approaches, such as TLMs and other improvised materials. This era was devoid of modern technology, such as computers. However, these days, knowledge dissemination utilises computer technology in instruction for Social Studies Education to enhance our effectiveness in lesson delivery.

ACT-1 certified that;

> Aside from my first-degree formal experience in pedagogical training, the Norwegian Digital University's outfit, Digital Means of Teaching (DMT), developed a retraining programme on interweaving pedagogy with technology. This training programme helped equip us with the emerging pedagogical processes in digital communication in Social Studies.

ACT-2 remarked that;

> My formal pedagogical training first saw realia and other instructional resources alongside the methods, techniques, and teaching and learning strategies as a trainee teacher in the College of Education in my 3-year diploma programme. During my six years as a tutor in this college, I have witnessed and continue to witness re-tooling in pedagogy, where technology takes centre stage in a PD programme mandated by GTEC.

AFCT-1 also pronounced that;

> My first-degree endeavour gave me my formal technological and pedagogical training. Before that, teacher-centred activities that were uncomplicated by computers were our primary sources of information transmission.

AFCT-2 also converses that;

> Aside from my initial pedagogical training as a professional teacher, teaching and learning were dominated by the traditional lecture and demonstration activities with no reference to computers. Now, I am privileged to continue to be re-informed and re-equipped on the modern and up-to-date delivery modes in Ghana's teacher training institutions with technology at the helm. Thanks to T-TEL

Responses given so far by the participants in categories CP and CT certainly manifest that Social Studies tutors at the colleges of education in the investigation have had the

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requisite and fundamental pedagogical tutoring during and after their formal training. According to them, this training experience has equipped them to deliver effectively on the subject matter and other concepts they are mandated to transmit in an instructional environment. Indeed, the study revealed that pedagogical processes are evolving with the hope of meeting the changing demands of Social Studies instruction at the colleges of education. For tutors to align well with these changing trends, refresher courses and training programmes are viable options. Even after the tutor's formal pedagogical training programmes, they continue to engage themselves with one form of PD, on-the-job training, to become more conversant with the emerging inclinations of modes of lesson delivery where technology integration in the pedagogical processes is more profound. Hence, Harleem et al. (2022) suggest that, as a result of the COVID-19 pandemic, online educational pedagogical training should be emphasised to enhance the efficiency of tutors' use of technology in instruction. According to GPE (2020), it has also been established that capacity-building training was offered to some CoE teachers in Africa, including those from Ghana, on the pedagogical process involved in using distance instructional technology. This study also confirms what CP and CT participants stated regarding pedagogical tutoring in relation to their instructional delivery.

Nonetheless, this revelation that the Social Studies tutors in the colleges of education in the study are imbued with one form or another of technologically influenced pedagogical experience required of them to remain meaningful in their domain as instructors who are in tune and astute with their responsibilities in the era of the COVID-19 pandemic is in agreement with Shah's supposition. practical pedagogical training and workshops that target the utilisation of technology in instruction are very

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vital if Social Studies tutors are to remain meaningful in the instructional environment.

4.3.2 Presentation of the FGD data and analysis

A focus group discussion (FGD) with the sampled Social Studies trainee-teachers regarding their tutors' infusion of technology, pedagogy, and content integration into a lesson in the era of the COVID-19 pandemic, espoused the following responses:

4.3.2.i Tutors' utilisation of technology and content in instruction

"Tutors' competency in content and technology integration in Social Studies instruction" was also significant in the FGD. The participants were asked to indicate how competent their tutors were in the content of their instruction. Responding to this question, participants gave the following views:

SJCS-1 confers that;

> Technology integration in instruction refers to how technological tools dictate the pace of various activities to make them more comprehensive in a teaching and learning environment at a given time. Therefore, our tutors' ability to transmit knowledge to us, often through Zoom, Videoconferencing, and Google Meet, with exquisite control of their technological gadgets during COVID-19, often inspires their entire presentation.

SJCS-2 also conversed that;

> At certain times, the tutors go the extra mile in providing us with more comprehensive explanations of the course outline by utilising different and reliable search engines in their efforts to make their tuition more comprehensive, especially during Google Meet sessions. This intermarriage between content and technology, aided by internet connectivity in the era of COVID-19, allowed us to access more information than our sources of reference.

SJCS-3, too, communicated that;

> Tutors are very competent at integrating content and technology in Social Studies lessons. Their consistent use of LMS, Google Classroom, and WhatsApp in our virtual class activities reminds us of how well our tutors combine content with technology in their lessons.

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SJCS-4 did indicate that;

> As students, we often do background checks concerning some of the information our tutors give us online. Almost all the counter-checks we embark upon from the various internet reference books and search engines bring us back to the same information given during our tutorial sessions with our tutors. More importantly, how technological gadgets are used for lessons by our tutors at a given time is a testimony of how well they combine content with technology in this period of COVID-19 in our distance instruction.

BCS-1 cited that;

> Zoom video conferencing presentations, which have been the main presentation style for our tutors in this COVID-19 pandemic era, are evidence of their control over the content and technology integration in their lessons.

BCS-2 also suggested that;

> Tutors' manipulation of various teaching and learning tools on their laptops and tablets in their lessons typically boosts our interest and motivates us to get along. They do it so well in such a manner that it makes us feel motivated to replicate their style when we go out as fully trained teachers. The key concepts are well explained and understood in many of these instances.

BCS-3 also noted that;

> Our Social Studies tutors' technology and content combinations typically help clarify the meaning of the subject under study during lectures. Their knowledge of the search engines on the Internet, as they apply their instructional devices during a lesson, helps clear possible doubts or misunderstandings that may arise. Some of these efforts display how competent they are in that area, especially in this period of virtual instruction due to the COVID-19 pandemic.

BCS-4 insisted that;

> Technology usage in our Social Studies tutors' lessons has been very encouraging. In many instances, tutors employ one form or another of modern learning tools associated with the web to make teaching and learning more convenient. This has allowed us flexibility in class activities at our convenience and pace.

The responses given by the participants from SJC show that tutors have complete control of technology and content usage in their lesson presentations. From their point of view, such efforts by the tutors in their Social Studies lessons give them the hope that they can replicate their modes of lesson presentation when they finally assume

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their respective roles as Social Studies teachers at the basic level as they see their tutors as role models in content and technology integration in class.

SACS-1, contributing to the discourse, says that;

> Tutors do merge technology and content at certain times. Sometimes, technology is involved in content delivery, and they do so effortlessly. This indicates that if the school were so fortunate as to possess all the needed educational technology equipment, they could do much more for our benefit as trainee teachers.

SACS-2 evinced that;

> Although not so frequent, tutors' use of technology in our class activities typically adds variety to the process during distance instruction due to COVID-19. As other forms of technology like LMS and Zoom come on stream, note-taking becomes very swift, concise, and comprehensive, unlike when class activities are overly elaborated on the chalkboard, where many materials are presented. With Zoom video conferencing, the tutor's explanation becomes brief and comprehensive during our school closure, where online classes are in force due to the pandemic.

SACS-3 also said;

> From our experiences with our Social Studies tutors regarding technology and content amalgamation in a lesson, we have seen that they often exhibit good competency. This, coupled with the explanation typically provided during the lesson, suggests that they are well-informed in their field. They have been able to do so better during the COVID-19 pandemic.

SACS-4 supported the view given by SACS-3 when he voiced out that;

> Our tutors are proficient in integrating technology and content into their lessons. Unfortunately, they are not well-resourced with the technological tools they need to utilise their technological expertise in education for our benefit fully.

The responses of the SAC participants were a further testament that Social Studies tutors have the capacity and know-how to utilise technology and content in lesson presentations. However, inadequate modern educational technology resources undermined their quest to incorporate content and technology effectively. Afterwards, ACS participants shared their views on this issue.

ACS-1 put forth this view;

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> We have confidence in our Social Studies tutors' control of the content and technology in the lesson delivery processes. However, their wish to integrate technology into lesson delivery is botched by insufficient technological tools. For instance, internet facilities are not accessible to them.

ACS-2 shares a similar view when he says,

> Tutors are always eager and willing to incorporate technology into content during pedagogy. Unfortunately, their efforts are rendered incomplete due to inadequate technological facilities.

ACS-3 said;

> Seeing our tutors' use of technology at certain times is quite comforting. However, for most of the semester, this demonstration is not a prominent feature in their lesson presentations for reasons beyond their control. Due to the COVID-19 pandemic, we use our handsets at home to engage in virtual activities on our technological gadgets.

ACS-4 proclaimed that;

> Technology and content integration know-how are undoubtedly key to our teachers' background knowledge. Unfortunately, some teachers lack the necessary technological support to utilise technology in their academic work effectively.

From the responses given by the FGD participants from ACE, it became clear that tutors are ever ready to put their technological and content integration in lesson presentation at their disposal but are demotivated to do so as a result of a lack of the requisite technological tools in the school needed to make the realisation of such wish possible.

AFCS-1 revealed that;

> I have observed that our Social Studies tutors request that some of us with internet access on our mobile devices contribute to a lesson being taught in this era of COVID-19 virtual classes, as it is an indication of their desire to integrate technology and content in their lessons.

AFCS-2, echoing his view, said,

> Our Social Studies tutors' use of technology and content in lessons has proven to be an experience they are always ready to share. However, resource constraints prevent them from doing so in their lesson presentations. COVID-19 has been a major factor in our distance instruction, as it is unreliable.

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AFCS-3 agreed to the assertion made by AFCS-2 when he said,

> Understandably, our tutors are willing to use modern technology in their teaching, but are limited by deficiencies in technological tools and facilities.

AFCS-4 reaction to the motion was;

> Content and technology are not characteristics of our teachers' lesson activities. We often hardly see tutors interweaving technology with content because we lack the technological incentives to make it possible, such as computers and the Internet. However, COVID-19 and school closures have prompted them to become very innovative in using their personal computers and data to engage us virtually.

Participants from the AFC maintained that their tutors are technically capable of integrating technology and content, as some participants from other colleges mentioned in their Social Studies lessons. Nevertheless, they have learned that their tutors cannot do so due to their college's lack of technological tools and equipment.

The ACE and AFCE did not consistently do so because they lacked access to the technological tools and machines required for effectively implementing their responsibilities.

Assessment of these qualitative data from the UCES participants mirrors a close relationship with Hu and Fyfe's (2010) position on the technological know-how of teachers when they professed that it permits faculty to choose suitable ICT tools to be utilised in their instruction to augment their teaching (p. 188). In the process, the self-confidence and skills of teachers in content and technology integration are buoyed as they centralise technology in their instruction.

Therefore, the participants' responses regarding the use of technology and content in instruction indicate that students are in tune with TAA in their instruction. They gave examples of the gadgets that characterise the technological processes in content teaching, such as computers, handsets, projectors, Zoom Videoconferencing, Google

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Meet, and Google Classroom tools, which some of them were privileged to use during the COVID-19 pandemic to sustain their instruction and buttress their assertion.

The UCES view aligns with Mishra and Koehler's (2006) perspective, which regards technology and content in pedagogy as a means of understanding how instructional delivery can be adapted over time. This indicates that the student participants possess in-depth knowledge of technology and pedagogical content. Using this discussion, Alexander (2004) attempts to put into practice the earlier assumptions, with the supposition that teachers should be prepared to acquire knowledge in computer software and portable instruction as they gain insight into the educational advantages of utilising the supposed innovation. Moreover, Rogers (2003) postulated "that innovations offering more comparative benefits, compatibility, ease, trialability, and observability will be adopted faster than other innovations". It can be inferred that the COVID-19 pandemic presented a valuable opportunity for tutors to utilise relevant technologies in their pedagogical practice as they sought to overcome some of the barriers posed by the pandemic. According to Bennet and Bennet (2003), research shows that all the benefits innovation presents influence faculty members' likelihood of adopting an innovative concept into their teaching. Therefore, the faculty should try to be conversant in the appropriate technological software for the desired instruction.

The foregoing discourse is a testament that content and technology utilisation in the instructional processes by tutors was an indication of their TA and adaptation of innovative concepts to inculcate good instructional ethics and practices into the teacher-trainees. The sustenance of such ethics and practices by tutors could help develop the teacher trainees' desire to update their knowledge as they are taught

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through persistent practice on computer- and internet-technology-oriented instructions. Consequently, doing the same thing by students may not pose a problem since they have seen their tutors engage in the practice during their training.

It is established from the perspectives of the FGD from the five colleges that Social Studies tutors have the capacity and control over online instructional technology and content utilisation in their instruction. Hence, by leveraging their capacity and control in online instructional technology, tutors can create engaging and effective learning experiences that lead to sustained instruction and improved student outcomes in the period of crisis like the case of COVID-19 pandemic era.

4.3.2.ii. Technology, content, and pedagogy adopted by tutors in their online activities

The technology, content, and pedagogy used in the class environment during the COVID-19 pandemic also revealed the following responses from the participants. SJCS-1 said;

> In our tutors' efforts to achieve their set objectives for the day, they choose the type of technology that is in harmony with the subject matter in context, as they combine them effectively with their teaching methods, techniques, skills, and strategies to enhance their instructional delivery at our level in this era of COV-19 pandemic. We are not in the school as a group of learners, but our tutor's skill in combining technology, pedagogy, and content knowledge synchronously and asynchronously via LMS allows us to sustain our studies.

SJCS-2 mentioned that;

> The technology, pedagogy, and content carefully chosen by the tutors as they apply them during instruction attest to our tutors' level of expertise in executing their duties. Hence, their ability to select the right technological tool that effectively conforms to the central problem, as well as the techniques and strategies used to transmit the subject matter during the instruction during this period of school closure, demonstrates the level of competence of our Social Studies tutors in our college.

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SJCS-3 says;

> Tutors' technological, pedagogical, and content knowledge is often exhibited in online video conferencing and other virtual instructional mediums. They engage us in lectures and discussions and commonly exhibit knowledge and control in their choice of technology, skills, and mastery of the subject matter in their lesson presentations during this time of the COVID-19 pandemic.

SJCS-4 suggested that;

> Because of the COVID-19 emergency, our tutors have opted for virtual instruction. In this situation, our tutors have managed to transmit the class activities to us through virtual discussions in our respective locations since school is not in session.

BCS-1 suggested;

> Tutors find an appropriate interplay between technology, pedagogy, and content when they select and use technologies and teaching skills that suit their level and our learning needs.

BCS-2 also stated that;

> Tutors consider our prior knowledge and learning needs, the available technologies, and the context in which instruction occurs. In this scenario, the tutor exhibits his technological, pedagogical, and content knowledge in the teaching and learning environment.

BCS-3 observed that;

> When tutors appropriately inculcate different forms of ICT, manifest digital skills and attitudes in the effective incorporation of technology in a teaching and learning process, and see it as very significant to the student's learning needs, then it becomes evident that they are technology-obsessed in this era of the COVID-19 pandemic.

BCS-4 commented that;

> As a potential technology-inclined teacher, I expect our tutors to model their instruction so that technological devices may dictate the pace of our pedagogical sessions. This will help us become conversant with how technology in pedagogy operates, which I think will allow us to replicate it in our future lessons.

The SJCS and BCS in the FGD demonstrated in-depth knowledge of tutors' technological, pedagogical, and content knowledge. They affirmed the tutors' use of the TAM in their Social Studies lessons as and when they deemed desirable, most importantly during the pandemic, when in-person instruction was temporarily

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prohibited due to health grounds. The participants view replicating the concept in their future lessons as possible, as they perceive themselves as latent technology-innovative teachers. Afterwards, participants from SACS made their suggestions for the incorporation of technology in instructional delivery by tutors as follows:

SACS-1 stated that;

> As young and would-be tutors who are prepared to experiment and take risks, we expect our tutors will also perfect technology incorporation into pedagogy in their professional practice so we can learn from them accordingly.

SACS-2 noted that;

> Our tutors' use of technology, pedagogy, and content concepts in our Social Studies class is limited. Resource inadequacy may partly be attributed to this limitation in our lessons. Tutors, according to them, are prepared to employ the concept. However, their hands are tied by the unavailability of the facilities that best dictate the pace of technology usage in their lessons.

SACS-3 also noted that;

> Tutors are not ready to co-construct their scheduling on the use of technology in pedagogical activity with us. I see us, the students, as gurus of technology and our tutors as leaders of teaching and learning. Therefore, putting the two together could, in my view, help improve the course of technological, pedagogical, and content delivery in this information communication era, where some of us can manipulate the internet on our devices to yield the required results on many occasions. So, using our phones and other devices, we can support our tutors in the instructional processes in emergencies like the COVID-19 pandemic when our school is closed down.

SACS-4 concurs that;

> To the best of my knowledge, the technology integration into the instruction concept has not been a vital component of our learning processes. Our tutors do not often mention technological applications in pedagogy.

The SACS participants' responses portray inadequate technological, pedagogical, and content knowledge application in their lesson presentations. Accordingly, the participants largely attribute the tutors' failure to make the technological, pedagogical, and content knowledge concept an integral part of their lessons to the insufficient

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nature of information communication technology facilities that effectively drive the technologically motivated instructional concept in the instructional environment.

ACS-1 remarked on the discourse by saying that

> We, the students, sometimes use text message applications, social links, and other weblogs purposely for academic interactions and collaboration. Although our school is not accessible to the Internet during our instruction, our tutors, through their efforts, sometimes use some of these technological tools in a virtual class with us during the COVID-19 pandemic.

ACS-2 noted that;

> Constraints in our school's technological facilities make it difficult for our tutors to effectively integrate technology into their daily lessons. I do not blame our tutors for their inability to do so since they can do little.

ACS-3 remarked that;

> I have observed that our tutors are passionate about using technology in their lessons. However, they are handicapped by the college's inaccessibility to the World Wide Web and other educational technology resources required to make this a reality.

ACS-4 maintained that;

> Our Social Studies tutors are hardly seen using technology in pedagogy. Although they are well informed in this area, coupled with their sound expression in the contents of our course outline, they usually say that the internet facility cannot easily be improvised to enable you to access it.

AFCS participants' perspectives on this matter were also taken as follows:

AFCS-1 opines that:

> From my observation, technology integration into instruction has not been emphasised as much by our tutors in their class activities. The intended technological tools are not easy to come by in our college, as we are a very "young educational institution". Therefore, not all the modern facilities we need for academic work are available. This probably explains why our tutors cannot prioritise incorporating innovation into our lessons in their lesson presentations during COVID-19.

AFCS-2 pronounced that;

> To my knowledge, technology has not been a significant feature of our Social Studies instruction. Tutors always talk about their readiness to

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> incorporate technology into their teaching, but the college's lack of the desired equipment obstructs them.

AFCS-3 divulged that;

> Technology, pedagogy, and content integration are not things we are very familiar with in our Social Studies class. It has not often been a practice where our tutors are seen incorporating technology in our lessons. As trainee teachers, we wish to be exposed to this practice to follow and do the same when posted to the basic schools after completing our course and graduating from here. So, it may be difficult for us to imitate it there.

AFCS-4 also contends that;

> I have read a little about integrating technology into the pedagogical process, but it seems to be a distant component in our everyday lessons. I suppose the nonconformity to this concept prior to the COVID-19 pandemic may primarily be due to insufficient educational technology facilities. I believe it is the engine that propels the technology concept. So, their unavailability has done little to inspire confidence among our tutors in its application to the college.

Practically, the responses from ACS and AFCS participants indicate that there was no compromise in technology, content, or pedagogy due to the unavailability of technological tools in their colleges. From the standpoint of the FGD, tutors' knowledge of technology, pedagogy, and content integration in a lesson helps banish abstraction and embrace reality in the learning process during the pandemic. This view was confirmed by ADEA, AU/CIEFFA, and APHRC (2022). It was further agreed that teachers' capacity, including those in the CoE, should be built using technological tools and approaches. Efforts geared towards preparing instructors with the capacity needed to engage learners in distance instructional procedures were encouraged by governments and development partners such as GPE and the World Bank (ADEA, AU/CIEFFA, & APHRC, 2022). Incidentally, SJCE, BCE, who were relatively technologically endowed, and to some extent, SACE, helped their Social Studies tutors to put their knowledge acquired through their periods of pedagogical practice to use in some of the technological concepts at the disposal of their trainee

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teachers in the period of the pandemic. This was a clear case of TA by the SJCE, BCE, and SACE. Unfortunately, a similar picture cannot be painted about ACE and AFCE, where such facilities were lacking, implying a rejection of technology (TR) in these colleges. Trainee teachers in these disadvantaged institutions voiced their disapproval of this issue. They said they wished they could experience technological, pedagogical, and content integration in lesson delivery to replicate it in their class activities after graduating from college. The responses given by the participants in the FGD reflect the desire of pre-service teachers to make technology a centrepiece of their future instructional delivery, according to a study by Kapici and Akcay (2020). Unfortunately, their tutors attribute this instance to TR due to inaccessibility. Kapici and Akcay (2020) further contend that today, students utilise various software tools in social networks and text messaging to communicate and collaborate due to their usefulness and ease of instruction, as Davis TAM indicates. However, it is difficult to say that teachers use these tools efficiently. Hereafter, teachers who have organised their technological know-how exhibit confidence and will incorporate this epistemology into other subject matter sooner. Additionally, Kapici and Akcay (2020) also revealed that teachers' desire to utilise technology in instruction is an irrevocable prerequisite in a technological setting controlled by swift advances in instructional technologies. Hence, Kapici and Akay's assumption focuses on an instructional environment showing evidence of Rogers's ID, propelled by TAA. Moreover, Kapici and Akcay's contention resonates well with the input by SJCE, BCE, and SACE participants on this issue in the investigation.

(Mishra & Koehler, 2006; Koehler, Mishra, & Yahya, 2007). Technology, pedagogy, and content are comprehensive areas of established knowledge that faculty need to use effectively if technology-oriented instruction is to be implemented. Specifically,

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the knowledge of pedagogy and content intermingles to produce a lithe instructional atmosphere for various groups of students. In this regard, the reliance of most Social Studies tutors on computer technology in virtual and online lesson delivery and assessment during COVID-19 was a mark of competence and should be highly commended. This will enable them to sustain this practice in instructional delivery. From his perspective, Hernandez (2021) affirms that auspiciously, the progress of the internet and the extension of online teaching since the early 2000s have resulted in a wealth of instructive research with the possibility of aiding tutors familiarise themselves with this new dawn and modification of their methods to improve the technological medium in use. However, other tutors who integrate technology into their instruction for reasons beyond their control should be encouraged to find innovative ways to ensure that their trainee-teachers benefit from their expertise in technology integration into instruction. Therefore, Davis's (1989) suggestion that information systems (IS) are grounded in the perceived ease of use and the usefulness of the technology is relevant to the submission here. It also reflects Rogers's (2003) IDT, where the failure of an individual to adapt to an innovation signifies rejection. Hence, a tutor's confidence level in the use of technology in instruction must be resilient if innovation in instruction aids in realising its desired goals and ultimate aim in the Social Studies curriculum in colleges.

Ii was concluded that technology, pedagogy, and content utilised in instruction during the COVID-19 pandemic by Social Studies tutors in the study were ideal in their resolve to function effectively in their instructional responsibilities. By implication, tutors demonstrated resilience and adaptability in response to the pandemic by ensuring continuity and learner-centred instruction as they integrated technology, pedagogy and content in their instruction during the COVID-19 pandemic.

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4.3.2.iii Online Instructional Modes Used in Social Studies Lessons

The investigation continued with a further probe into the "online instructional modes used in teaching Social Studies lessons during the COVID-19 pandemic" SJCS-1 participants responding to this instrument indicated that;

> Occasionally, our tutors in our college premises update themselves on new trends in technology-oriented instructional delivery processes. Consequently, our tutors use synchronous and asynchronous modes to facilitate online instruction.

SJCS-2 submitted that;

> Our tutors' innovative synchronous teaching and learning help boost our understanding of their lessons. This is exemplified when they come "fresh" from their re-training and workshop programmes on campus or outside.

SJCS-3 also shared the opinion that;

> For quite some time now, our tutors have been attending career development workshop programmes on our campus every Wednesday during the semester. So, no academic work is done that day. I hope they attend other on-the-job training outside campus, but I do not know whether they are mainly technology application-based lessons. However, asynchronous mode is used as COVID-19 does not permit physical interaction between us and our teachers.

SJCS-4 suggested that;

> We usually meet our tutors from our respective locations to simultaneously engage in online class activities. At certain times, we also complete class activities by visiting our portals to undertake exercises and assignments at our convenience.

The submissions made by the SJCS were that their tutors used synchronous and asynchronous modes in their activities as a result of the on-the-job training they attended. However, they are not informed whether it is educational technology-oriented or involves other issues. However, their emphasis was on synchronous and asynchronous modes in their interactions with them to bridge the gap created by the temporal school closures made possible by the COVID-19 pandemic. Given this, Amarh's (2022) publication entitled; "Assessing the Impact of COVID-19 on Teaching and Research: A Ghanaian Perspective" where stated that COVID-19

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pandemic in diverse ways affected the traditional modes of instruction at all levels of education that the pandemic caused a change to the traditional mode of delivery is a confirmation of SJCS's response on the use of synchronous and asynchronous modes of delivery by their tutors was the mode of delivery during the pandemic. Furthermore, the view shared by SJCS resonates with the findings by Mulder, Bone, French, and Connelly (2023) in their study; "Navigating the transition to online teaching at the University of Melbourne Teacher Education during COVID-19: Approaches, Reflections and Insights", which shows that Melbourne Graduate School of Education, adopted a range of synchronous and asynchronous delivery methods and refined these in subsequent iterations of their subjects. According to Mulder et al.(2023), the tutors' use of YouTube videos, WhatsApp videos, Zoom video conferencing, Skype, Google Classroom Module platforms, and other learning management systems (LMS) helped the Melbourne Graduate School of Education lecturers to sustain instruction through the synchronous and asynchronous modes. So, it is established that the synchronous and asynchronous modes of instruction adopted by the SJCE tutors during the pandemic were a step in the right direction.

BCS also made an input on this matter, and what came up is: BCS-1 said;

> Tutors have been attending workshops and training programmes to enrich their knowledge. However, we are not privy to the content of their workshops. We know that sometimes they use "new" ways of teaching, especially in the absence of in-person, which we usually appreciate.

Participant BCS-2 evinced that;

> Our school has a re-training programme for our teachers every Wednesday. However, I do not know whether it is technology-related. Based on this, we can interact with them from our homes during the pandemic to engage them in lessons at different times.

BCS-3 says;

> Every Wednesday during the semester is set aside for our tutors' re-training programme on campus. Nonetheless, I have no idea if it is

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> technology-based only. Other related areas are probably involved, enabling them to teach us online pedagogy asynchronously.

BCS-4 put forward that;

> I know that re-training programmes on technology applications by our tutors have been a visible engagement of our tutors during the semester. We have, therefore, been relieved of our Wednesday class attendance since that is the period scheduled for our tutors' programme. Several themes integrating into education are central to our online instruction, which usually occurs asynchronously due to the pandemic.

BCS submissions confirm the views shared by the SJCS earlier that their tutors used both synchronous and asynchronous modes during the pandemic. This was an indication that TAA was well in place in these CoEs.

The perspectives of SACES were also depicted as follows: SACS-1 voiced out that;

> The United Kingdom Overseas Development Programme (UKODP), in collaboration with the Ministry of Education and GTEC, has been organising a career development training programme called "Transforming Teacher Education and Learning (T-TEL)" on our school premises. I suggest that once it borders on the transformation of teacher education and learning, the programme has an element of technology. However, I do not know about the content of their modules. Because of the pandemic, our tutors have adopted an asynchronous teaching mode.

SACS-2 avers that;

> Technological facilities handicap tutors. However, we are privileged to have them engage us on our online portals via our handsets so we can interact with them asynchronously. This was made possible by the workshop programmes they have been attending at specific intervals.

SACS-3 mentioned that;

> Now, workshops have become a routine for our tutors every Wednesday. As a result, we are relieved of our Wednesday tutorials. Because of the COVID-19 pandemic, we do our private studies, assignments, and other academic activities flexibly online from our various locations.

SACS-4 mentioned that;

> We are resource-hampered as a college, but our tutors typically engage with us online through our portals at different times since school is not in session due to the pandemic.

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SACS views shared portrayed evidence of one kind of mode of teaching or another by their tutors during the pandemic. However, their college was less technologically endowed than the SJCE and BCE. However, they did so with the support of their respective smart devices at their own expense. ACSs in the FGD also presented their views as follows: ACS-1 said;

> Our school is not endowed with the technological facilities that were expected. As a result, it is not easy, as we are not permitted physical activities with our tutors in school due to school closures. However, some of our tutors, including the Social Studies tutors, have been doing well using their handsets to interact with us virtually on the phone.

ACS-2 verbalised that

> Professional development is key to the activities of our tutors on campus. Before COVID-19, most were always seen in the middle of the week, congregating at the assembly hall for professional development training. I believe from this background that they can interact with us from their initiatives on their cell phones and tablets at different times, although not consistently as thought.

ACS-3 also mentioned that;

> Tutors attend other technology-oriented teaching and learning workshops besides their usual on-campus training. Our school is also technologically handicapped. However, interaction with them due to the pandemic is sometimes conducted via WhatsApp messaging, which may not be accessible to all of us.

ACS-4 also opines that;

> Although our tutors have been attending workshops on campus, this has not significantly impacted our interactions with them during this pandemic era. WhatsApp communications in instruction and other asynchronous processes have not been due to a poor network.

The AFCES also shared their opinions as follows: AFCS-1 informed that;

> Sustaining academic work during the pandemic has not been a good experience for some of us. At times, our tutors attend workshops. I am not aware of the details. Online instructional technology has not been a priority for our Social Studies tutors. So, I suggest they are probably unfamiliar with that area, so we hardly see them using it during the pandemic.

AFCS-2 suggested that;

> I have not seen our tutors attending purely technology-based workshops. That probably explains why online instruction in our

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> Social Studies lessons is not noticeable in this era of COVID-19. They probably do attend, but they are on the blind side of some of us students, as some facilities hinder us.

AFCS-3 shares the view that;

> I can only speak about the professional development training our tutors have been attending for quite some time now. However, I have not been informed whether it is based on technology. Other than that, I am unaware of any such engagement by our tutors. Hence, not much can be said about the mode of delivery due to the pandemic and school closures.

AFCS-4 mentioned that;

> Frankly, I cannot say much about our tutors' mode of instruction in this pandemic, as school is temporarily on break. However, I am informed about their attendance at the college-based career development training, which gives them some form of modern instructional training. However, our status as infant teacher education institutions does not help us sustain academic work now.

From the foregoing discourse, although the CES participants shared divergent views on online instructional modes used in teaching Social Studies during the COVID-19 period, the ACS and the AFCS, who are referred to in this study as laggards in the innovation diffusion process, could not tell whether the workshops their tutors attend on their campuses are online instructional modes based on technology utilisation in instruction. So, the assertion by Mulder et al. (2023) that "the application of online educational technology has tremendously improved among a good number of teacher training institutions" was very subjective**.** Practically, their finding was not the case with the ACE and AFCE as purported by their student participants (ACS & AFCS), as their deficiency of up-to-date online instructional technology gadgets and internet connectivity denied them of the full benefits of distance instruction during the COVID-19 pandemic era. Although Mulder et al.'s postulation holds for some colleges, that was not so for some colleges in some emerging economies like Ghana.

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The SJCS participants in the FGD mentioned that the online instructional modes used in teaching exposed them to new trends and innovative instruction. This statement made by them agrees with Shin's (2006) postulation that teachers are likely to be persuaded to utilise a novelty idea (online instruction) if they have the know-how in the use of innovative software packages (Zoom video conferencing, LMS, Skype, WhatsApp, e-mail, and Telegram), and about its usefulness in their instruction at a "time".

Moreover, the use of technology, as highlighted by TAM in the work process, is laudable and helps improve productivity. So, the SJCS's further submission of keeping them updated on the emerging trends in instructional delivery by their tutors aligns with Groth, Dunlap, and Kidd (2007) and Uerz, Volman, and Kral (2018) assumption that the teacher trainers are role models for pre-service teachers, should know and use instructional technology in an instructional setting to eliminate those limitations. In relation, Drent and Meelissen (2008) maintained that teachers gain experience in ICT by using it. Therefore, they suggest that teacher trainers increase their competencies by using ICT in lesson delivery and be models to pre-service teachers. Therefore, they should be encouraged to regularly attend workshops to update their technological competencies, as today's software options may become tomorrow's outdated programs.

In sum, the tutors at the CoE in the study employed both synchronous and asynchronous online instructional technology modes in their instruction during the COVID-19 pandemic era. This implies that the combination of live and pre-recorded self-paced online instructions for the students at different geographical locations at different times helped increase student engagement and motivation

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4.4 Challenges Tutors Face in the Employment of Instructional Technology

This section of the study is informed by Research Question 5, which emphasises the challenges college education tutors face in using instructional technologies in their lessons. Although the study shows that most tutors embraced online instructional technology during the COVID-19 pandemic, challenges hindered its smooth implementation. This investigation probed further to unravel how some stumbling blocks were exhibited.

4.4.1 Manifestations of the stumbling blocks

The inquiry was made about how the tutors' challenges in using online instructional technology during the COVID-19 pandemic manifested. The ensuing responses that emerged from the CP and CT participants:

SJCP put forward that;

> Among the challenges the college faces in integrating technology into lessons by tutors, as dictated by the COVID-19 pandemic, are the inconveniences posed by the unreliable nature of the low-speed internet. Many of the tutors' activities are virtual. Hence, their inability to access the web as expected frustrates them. Therefore, academic work is impeded in one way or another.

BCP also remarked that;

> Tutors have been complaining about abrupt power and internet slowdowns and stoppages. Although the college has a standby generator to come on stream in the event of this, the cost of its maintenance also poses another problem of regular usage, especially in the era of COVID-19, when tutors need power (electrical energy) to transmit information to the students virtually.

SACP explained that;

> Before the advent of COVID-19, the college made a special requisition to the Ministry of Education through the district education office to furnish us with standardised computers and other modern education technology facilities to help facilitate teaching and learning. However, our request has been partially met with equipment that does not meet the standard as expected. Our inability to support students with high-speed internet and other technological facilities to sustain their studies

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> during the pandemic poses a major headache to the college due to resource unavailability.

Participant ACP, on the other hand, declared that;

> The major stumbling blocks we have encountered in incorporating technology in our tutors' lessons have been the lack of requisite technological know-how and internet connectivity on the part of some tutors, inadequate computers, and a lack of internet facilities. From my perspective, these have been the primary factors driving the technological needs of modern educational institutions worldwide.

AFCP made mention that;

> Modules on using technology in instruction are available online for tutors to consult when in doubt and refresh their knowledge of educational technology applications. However, the absence of the World Wide Web in the college mitigates smooth academic work during COVID-19. Other peripheral factors, such as an insufficient lecture theatre and auditorium, also militate against instruction.

The CPs highlighted poor internet connectivity (SJCP), high cost of maintenance of stand-by generator and poor internet connectivity (BCP), low-grade computers and internet connectivity (SACP), lack of requisite technological know-how of tutors, and lack of internet access (ACP), and absence of World Wide Web (WWW) and modules of technology integration into instruction (AFCP) as some of the significant stumbling blocks confronting their tutors' effective integration of technology into instruction.

The CT participants, on the other hand, in their response to the earlier discourse, expressed the following views: SJCT-1 disclosed that;

> Although the college is fortunately endowed with computer facilities, the unreliable electricity transmission and low-speed internet access that "lubricate" these gadgets to yield the necessary dividends are problematic. These occurrences sometimes result in the abrupt end of the lesson and, subsequently, impact productivity because my entire lesson is transmitted via Zoom due to the COVID-19 pandemic.

SJCT-2 equally mentioned that;

> However, for a robust internet supply, the college could have no problem incorporating technology into Social Studies lessons. Other auxiliary facilities are available and workable. Tutor technological competency is also assured. The nature of the technology used (Zoom)

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often makes it difficult to track students and their level of concentration during lessons.

BCT-1 was also of the opinion that;

> Supporting facilities such as computers and projectors are readily available in the college. However, the internet providers are grossly disappointing and therefore impede the smooth utilisation of technology in our lessons as anticipated. Real-time attendance is also tricky since students log on and off due to locational disadvantages. Other peripheries, such as poor power supply and inadequate technology-oriented special re-training programmes organised regularly, are some stumbling blocks that hinder practical technology usage in our Social Studies tutorials.

BCT-2 insists;

> Suppose specially organised technology incorporation into lessons workshops is organised regularly to put us on track with emerging trends, and a reliable internet facility is provided. In that case, it will be better for our instruction. Again, non-attendance to class is due to the maximum capacity of virtual class members that could be accommodated in a Zoom class. Although some of us are familiar with and have been using Zoom and other internet-based technologies in our lessons, more needs to be done in terms of high-speed internet provision and retraining to incorporate some level of proficiency in our specific lesson presentations.

SACT-1 confers that;

> Our main setbacks in technology usage during our lessons have been unreliable internet and poor attendance records, mainly due to the large class size. Monitoring has become a significant issue during the COVID-19 pandemic. To facilitate effective communication with our students, we need to have an accessible and reliable information communication highway that helps us fully utilise our knowledge of modern instructional technology in the interest of our students within our online instructional environment.

SACT-2 offered its contribution this way;

> The traditional information dissemination system in class gradually gives way to a technologically friendly instructional environment where computer and internet applications take centre stage. Unfortunately, our college lacks the necessary facilities. Additionally, there is a significant issue with class attendance, as students can log off at any time due to perceived poor internet connectivity and the inadequacy of lecture auditoriums, which are necessary to facilitate instruction.

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ACT-1 did mention that;

> The college is hindered by the lack of Internet access for students and tutors in instructional, seminar, and lecture settings. These have been significant setbacks in using technology in my lessons. A significant number of the tutors and students who are Generation Citizens could have equally benefited from these facilities in their efforts to impart knowledge.

ACT-2 was also of the view that;

> As an academic institution of modern repute, it is expected that up-to-date technological facilities, such as smartboards, Wi-Fi networks, and upgraded lecture theatres, are available and in use. However, this is not the case here in our college. Therefore, one can imagine how difficult it is for a tutor to try to make technology a fundamental constituent of his instruction.

AFCT-1, in agreement with AFCP, stated that;

> Our school lacks basic amenities, such as lecture halls, computer facilities, a Wi-Fi system, and expertise in incorporating technological tools into instruction. I generally have some computer knowledge. However, to effectively apply technological tools like LMS and Google Meet to instruction, a small amount of retraining is needed, which is not readily available. This limitation is particularly evident in the current COVID-19 era, when students were unable to receive help when schools were temporarily closed.

AFCT-2 equally conveyed that;

> Tutors should undergo retraining in using technology in lessons to gain the knowledge needed to deliver technologically engaging and confidently effective lessons. Nevertheless, our school is still lacking the necessary facilities to make technology integration at least partially possible.

The CPs and the CTs shared similar views, suggesting that poor and low-speed internet connectivity, inability to monitor real class attendance as students log in and out, specified zoom class sizes do not permit large class sizes, unreliable power supply, incompatible technological gadgets as few have access to Android gadgets, insufficient lecture hall infrastructure, and re-training in technology usage in instruction were the main obstacles their colleges were encountering in their online instructional processes during the COVID-19 pandemic. This situation suggests that almost all the colleges in the study lack access to reliable and unimpeded high-speed

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Wi-Fi or internet facilities necessary to facilitate online academic activities during the COVID-19 pandemic. This occurrence confirms a study conducted in South Africa by Chigona and Chigona (2010) and Chigona (2017), who reported that "schools could not afford high-speed internet, which made connectivity slow and, in some cases, there was no internet because it was too expensive to procure. These results further confirm Handal et al.'s (2013) suggestion that the unavailability of the desired network and the general inconsistencies in teachers' use of technology confirm what other researchers have noticed" about poor internet access. However, online technology in instruction affords teachers and learners a unique environment in which to teach and learn, even in challenging situations where traditional teaching and learning methods might have been impossible in emerging countries.

Additionally, the BCTs' submission that "real attendance to online classes" by students as they log on and off at any time due to perceived poor internet inaccessibility brought about by the absence of internet facilities in the hinterlands, as well as the maximum capacity of virtual class members that could be accommodated in a Zoom class, did not paint a good picture of the level of some students' patronage and seriousness in their online class attendance to some extent. The SJCTs' indication that poor attendance records, due to large class sizes, made it difficult to monitor students effectively, was also a testament to the inability to engage students in online tuition smoothly during the COVID-19 pandemic.

Therefore, tutors' inability to access educational technology that specifically addresses their need to use online technology in their instruction was a significant impediment. Additionally, many tutors view themselves as generally prepared with some ICT knowledge, but not in applying specific tools used to deliver online lessons. Hence, as emphasised by Davis's TAM, full technology acceptance and adaptation

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(TAA) was undermined. According to ACTs and AFCTs, this situation made it impossible for them to sustain academic work with their students during the COVID-19 pandemic, when schools went on a mandatory and temporary break.

In other studies, "it is apparent that schools have limited hardware and software programs and that the limited technology equipment was not maintained (Blackwell et al., 2014; El Semary, 2011; Hartman et al., 2019; Kafyulilo et al., 2016; Raman & Mohamed, 2013)". As a result of "limited technological resources, learner-to-computer ratios were high, and discouraged teachers from using technology" (Chigona et al., 2010). Research conducted by Schrum et al. (2008) further revealed that "92% of teachers in their sample lamented the lack of technological hardware and software programs". As a result, some teachers reported that they had procured technological equipment from their funds (Tiba & Condy, 2021). In line with Tiba and Condy's accretion is the view shared by Musa, Okon, and Sule (2023) in their publication "Assessment of the impact of technology integration on the quality of education in the colleges of education in Nigeria", depicted that teacher educators in Nigeria current educational technologies are not readily available. When available, they are often personal properties of teacher educators rather than institutional provisions. Therefore, internet connectivity in the CoE in Ghana is considered one of the most crucial lubricants necessary to facilitate and sustain instruction, especially during the COVID-19 pandemic. Given this, the SJCTs, BCTs, and SACTs declare that the incompatibility of technological gadgets with Android devices, as observed in a few homes, also aligns with Musa et al. (2023). They mentioned that teacher educators in Nigeria have a low adoption level of current educational technologies, with most falling within the category of low adopters

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Moreover, the study reveals that some tutors were not explicitly trained to undertake certain class activities using specific technological tools, such as the LMS and Google Meet. The retraining in that area, which could have bridged the gap, was not forthcoming. According to some participants, it stifled their ability to employ technology confidently. This view, expressed by some participants, was in agreement with Ifinedo et al. (2019), showing that teachers ' know-how in technology deeply undermined the integration of technology, students' capacity in computer technology, insightfulness in teaching, and the scope of the class. Al Njadat et al. (2021), in their findings on the absence of re-training of faculty at Aqada University College on technological needs for instructional delivery, indicated that training and retraining of faculty members to make them compatible with modern technology and apply them in their proper order in education was one of the significant obstacles facing faculty. In this instance, the faculty's ability to gain knowledge in the nitty-gritty details of technology, procedures, and processes of its use could go a long way toward reducing the misuse period during instruction (Talebian et al., 2014). So, a teacher's background knowledge of technology is essential in utilising online instructional technology when necessary.

The study concluded that poor and low-speed Wi-Fi internet connectivity, unreliable power source, inaccessibility to the internet, the nature of technology (Zoom video Conferencing) frequently used, non-attendance to class marked by locational disadvantages to students, and the maximum capacity of virtual class members expected to be accommodated in a zoom class, and insufficient technology-related specialised training, among other related online technological resources, were the major stumbling blocks that prevented the tutors from effectively engaging the students in instruction during the COVID-19 pandemic.

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4.4.2 Supervision of technology-oriented instruction

On the question of "whether the supervision of online technology in instruction is normally observed during instructional hours or not", the CP and the CT participants divulged the ensuing views: The SJCP participant from the CP category stated that;

> Indeed, there has been no specific supervision of the online instructional technology lessons that our Social Studies tutors engage in with trainee teachers. The appraisals typically conducted at the end of every semester before COVID-19 have some elements that inquire about technology usage in a tutor's lessons. However, the COVID-19 pandemic has made supervising tutors in online classes with students a challenging task.

BCP also reported that;

> Strict supervision of the work process in lecture rooms regarding online instructional technology has not been adhered to. Generally, tutors routinely check whether they are in class during instruction. However, stern supervision of technology usage in their lessons is not usually done. Although some facilities are available, we still require reliable ones, such as high-speed internet, to make their work much easier.

SACP deposed that;

> Supervision of tutors' tutorial activities regarding the utilisation of technology in instruction is essential to practical academic work. However, the college's inadequate technological facilities make it impossible to verify whether tutors utilise technology in their lessons.

ACP opines that;

> Externally, it is the responsibility of GTEC to see to the general supervision, including the academic and managerial activities of the colleges. However, no specific supervision of online educational technology usage in instruction has been done since the legislative instrument establishing the Colleges Act in 2016 mandates them to serve as an oversight body responsible for regulating all activities and general supervision of the management of all the colleges.

AFCP equally reiterated that;

> The inadequacy of online educational technology facilities in the college has made it very difficult to supervise tutors in integrating technology into their lessons, as is expected from time to time.

All the CP participants in the investigation affirm that there has not been strict online instructional technology-oriented supervision. This was attributed to the school's

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inadequate technological resources for this purpose. Consequently, they sympathised with the tutors for such a shortfall.

The CT participants also made the following inputs on the supervision of online technology-related instruction by the local and external authorities:

SJCT-1 shared the notion that;

> Apart from the college principal, no external authority has been designated to supervise our school's tuition regarding the use of the right technological tools in teaching and learning in Social Studies education during this pandemic period. Practically, I see external supervision on "modern" instructional technology applications in Social Studies as non-existent.

SJCT-2 did mention that;

> Supervising online Social Studies lessons by an external supervisor has not been a regular part of our routine class activities, especially during the COVID-19 pandemic. I hardly ever see our principal checking whether the requisite online technology is used for a given lesson.

BCT-1 equally contends that;

> Real supervision of my tuition during COVID-19 is a distant thing. I teach with no such thing in mind since that experience has not been a characteristic of my lesson delivery. It is uncommon to see a supervisor in my class, even before COVID-19, observe whether my instruction is technology-oriented, let alone use the right technology for a specific lesson.

BCT-2 submitted that;

> It has never been my practice to have lessons supervised in class. Often, class activities are conducted without any such consideration in mind. I have been here for quite some time now. However, nothing of that sort has ever taken place. So, this period of COVID-19 is no exception.

SACT-1 maintained that;

> Supervision of classwork, in general, is barely felt, let alone supervision of the use of online technology in specific lessons during the COVID-19 pandemic. Most importantly, the school lacks technological gadgets that facilitate such activities. So, the college principal does not bother to assess whether tutors are in tune with the appropriate technology in their lessons.

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SACT-2 shared no different opinion when he avers that;

> The requisite online instructional technology that the school needs to engage the trainee teachers is not forthcoming. So, I hardly use online technology in my lessons, even during the COVID-19 pandemic. Given this, I believe the college principal does not see the need to determine whether I use technology in my lessons. Therefore, there has been no supervisory work on that, so far as my Social Studies lessons are concerned, and more importantly, in this era of virtual instruction due to school closures.

ACT-1 verbalised that;

> So far, none of my lessons have been supervised by the college principal or any other person or group of people mandated to do so, regardless of how the lesson is conducted at a given period.

ACT-2 also submitted that;

> I am not as enthusiastic about using online technology in my lessons during the COVID-19 pandemic. Hence, the college authority has not been interested in supervising such lessons. Already, the college lacks the necessary technology-related facilities to make such a venture possible.

AFCT-1 informed me of this idea;

> I have yet to witness the supervision of my lessons by an authority. The college specifically lacked the necessary technology to enforce online technology-linked lessons. As a result, authorities have not made it a duty to come in and supervise the incorporation of technology into their lessons.

The CT participants reported that examining online instructional technology-oriented lessons is a distant reality in their colleges due to inadequate technological facilities. The responses given by both CP and CT participants indicate that online technology-oriented lesson supervision has not been a significant part of the tutors' duties. Therefore, CP participants did not ascertain whether the right online technological tools are being employed for Social Studies lessons by those tutors who sparingly use online technology in their tuition.

Although some of the colleges in the study have indicated that they have access to online educational technology resources required to enhance instruction during the

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COVID-19 pandemic, supervision of technology utilisation in Social Studies lessons has not been adequate. Nevertheless, ACT, AFCT, and the CP participants at the technologically less endowed colleges noted that the mere absence of facilities does not encourage principals or the individuals responsible for carrying out such supervisory mandates to do so. These responses indicate that Social Studies tutors, irrespective of the level of their online instructional technology capacity, are not efficiently supervised in their quest to utilise technology or otherwise in their lessons. Whether the tutors employing technology are doing it right or wrong is a matter of concern. Studies have shown that knowing the technology is one thing, and effectively utilising it in lessons appropriately is another side of the issue.

Tesfaw and Hofman (2014), expressing the outcome of their findings in their study on instructional supervision and pedagogy in Uganda, aver that "instructional supervision is the supervision carried out by the headteacher, subject heads, and other assigned supervisors in a school to provide guidance and support to teachers". According to them, these supervisory roles of higher authorities help streamline instructional processes for the good of teacher education. Therefore, the views shared by the CP and CT participants contrast with those of Tesfaw and Hofman (2014). Moreover, Tesfaw and Hofman's study did not particularly consider the utilisation of online instructional technology in the processes of lesson supervision. More importantly, the periods and circumstances that necessitated supervision in the Ghanaian and Ugandan contests also varied, and the objectives the two studies seek to achieve differ. Whereas the Ugandan case occurred during a normal in-person delivery of instruction, the Ghanaian contest took place during the emergency period of the COVID-19 pandemic, when physical interaction between students and tutors was not permissible due to the contagious nature of the disease, forcing schools to close temporarily.

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From the foregoing, it can be deduced that the desirable supervision of Social Studies tutors in TAA instruction at colleges by internal or external authorities did not receive the attention and support it deserves. However, supervision is one area that requires considerable attention if teacher education in Ghana is to experience the ripple effect of continuous online technology instruction from teacher education to the Basic School level.

Generally, the stakeholders like the government of Ghana did provide some support, to teacher education, but their (teacher education's) inability to ensure that the right technological facilities are provided for instruction makes it very difficult for the supervisory bodies to supervise a process they have defaulted in ensuring that adequate facilities are available, although it was to some extent understandable since the occurrence was an emergency period of the COVID-19 pandemic. Therefore, the restrictions in place at the time, including limitations on people's movement and temporary school closures, limit the supervisory processes to some extent. These were the main challenges confronting teacher educators at the CoE at the time, in the utilisation of technology in instruction.

4.5 Available Institutional Support

This section of the thesis addresses Research Question 4, which focuses on the forms of institutional support available to faculty in their use of technology in instruction. During the COVID-19 pandemic era. Subsequently, participants in categories CP and CT inquired about the instructional technology-sponsored course(s) offered to tutors and how often such course(s) were made available to them by their institutions. The ensuing explanations were articulated by them:

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4.5.1 Instructional technology sponsored course(s) offered tutors

The CP and CT participants indicated the following;

SJCP said that;

> Individual tutors are sometimes sponsored to take short-term courses on modern trends in instructional delivery, offered outside the college premises, to enrich their knowledge of educational technology in the interest of the college.

BCP stated that;

> Tutors occasionally attend courses. Although such courses are free to the institution, it is our responsibility to provide some support to facilitate the tutors' smooth undertaking of these courses.

SACP confers that;

> Except for the T-TEL workshop tutors, who are hosted on our college premises and sponsored by the government of the United Kingdom, they have not been privileged to receive any other sponsorships specifically for instructional technology.

ACP also said;

> Sponsorship for instructional technology workshops has not been forthcoming. Except for T-TEL, which is strictly a technology-based workshop sponsored by BODA, tutors are not fortunate enough to attend purely technology-oriented workshops sponsored by either the government, an external body, or the college itself.

AFCP also disclosed that:

> Tutors are not sponsored to undergo technology-related workshops outside the college. However, T-TEL organisers have been our major career development training, which generally covers almost all the courses offered in the college.

The study revealed that some participants in category CP affirmed that short-term sponsored courses outside their colleges, focusing on online technology usage in instruction that sometimes last for a few days, are organised for their tutors to refresh and update their knowledge. These short-term courses, according to them, are offered at a time when school is not in session, enabling them to fully participate. However, a few of the CP participants did indicate that, apart from the college-based career development workshops sponsored for all courses, online technology utilisation

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workshops for tutors within the college or outside of it have not been a paramount endeavour. In disagreement, Harleem et al. (2022) argue that technologies can equip tutors with the desirable skills required to deliver in times of need.

Although the CPs' view on the provision of workshops and career development in-service programmes for the tutors was geared toward informing them of the changing trends of instructional delivery, it was in line with Harleem et al.'s (2022) view, despite the different views they shared on how career development programmes can be done. This implies that suggestions for such a training programme occurred with different foci. Subsequently, when the CT participants' views were sought on this issue, the following is what each of them portrayed:

SJCT-1 divulged that;

> Before the emergence of COVID-19, a team from the Norwegian University of Science and Technology visited our school to provide us with a brief training on LMS, Camtasia, Google Meet, and Google Classroom applications for instructional purposes. Since then, we have not had the benefit of such workshops. Other forms of career development programmes that are not online-inclined are still ongoing in college.

SJCT-2 stated that;

> It is uncommon to see the college involved in a technology-sponsored on-the-job programme for tutors on campus. The programme I am aware of is ongoing on campus and involves T-TEL, which is not preoccupied with technology. Although "new" ways of teaching that are not machine-based are learned in this workshop. It does not specifically direct us to the application of technological tools in teaching and learning.

BCT-1 certified that;

> Our school is involved in a retraining program during the semester, which requires every tutor to attend on a designated day each week. This programme is a collaborative sponsorship package by the government of Ghana and BODA. At certain times, the school provides individual tutors with per diem, transport fares, workshop fees, and other necessary expenses related to attending technology workshops outside the college.

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BCT-2 remarked that;

> To my knowledge, the college covers the cost of an on-the-job training programme and technical support outside the college's premises. However, little or nothing is done regarding individuals undertaking their technology re-training scheme outside the college's schedule. This does not motivate us to get involved personally in technology-focused career development training as expected.

SACT-1 declared that;

> Sponsorship of tutors to attend workshops on technology by the college or other bodies has not been the case for us tutors here. I have yet to experience such a technology-connected workshop that is either partially or fully sponsored by the college on our premises or outside. Notably, BODA has been the main sponsor of the T-TEL workshop for all the courses we have attended here on campus.

SACT-2 equally asserted that;

> Sponsoring tutors for workshops that integrate technology into Social Studies lessons, mainly, has not been an experience I have had here. Except for my inquiry and the zeal to improve my teaching through technology integration, I could have been less effective in that capacity. Even with such efforts in place, there are insufficient online technological tools and equipment. However, a community of practice exists among the tutors in the college.

ACT-1 also uttered that;

> For us in the Social Studies unit of the Social Science Faculty, as I presume for all the remaining five faculties, there has not been any package for technology-focused workshops. I suppose individual tutors have been doing well to educate themselves on the application of some basic online technological tools in lessons. Notwithstanding, the college is not equipped with the technological facilities needed to put what we have learned into practice. Hence, the redundancy in this capacity.

ACT-2 contends that;

> The college could have done us a great deal of good if it had allowed us to attend a sponsored workshop on incorporating technology into lessons at our doorstep. However, all I am familiar with is the T-TEL professional development programme, which we are told is sponsored by the United Kingdom government under the supervision of GTEC. This workshop programme is not particularly focused on utilising technological tools, but instead on the general approaches to teaching and learning, many of which we are already familiar with.

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AFCT-1 explained that;

> The college's sponsored workshops on incorporating technology into lessons could have been a good omen for us as teachers of the 21st-century classroom. The demands of technology in the classroom are so enormous that one cannot simply decide to apply it without careful consideration. Regrettably, we lack some of the essential technological facilities and peer mentoring needed to facilitate online instructional classes effectively.

AFCT-2 also alleged that;

> Securing sponsorship from the college or elsewhere for short-term training on technology usage in lesson delivery could have been a welcome opportunity. Although almost all the college tutors have some basic knowledge of computers. However, knowing how to apply specific technological tools in your lesson at a time is unfamiliar for some of us. Ill-advisedly, the college does not have the necessary technological facilities, let alone commit its limited funds to training tutors on facilities with which they are already severely handicapped.

The foregoing discourse on technology sponsorship course tutors has shown that a few of the tutors at the colleges in the study have had the privilege of being sponsored by their colleges and other external bodies to undertake short-term courses in modern trends of instructional delivery, in addition to the general one on T-TEL. However, a significant number of participants revealed that they had not had the opportunity to attend any online technology-based workshop, either sponsored by their college or an external body, institution, or group of individuals. Although they confirmed that the T-TEL workshop on PD has been an embodiment of their professional training in college for some time, they stated that the "computer technology in instruction" component was still missing. The implication is that technology adoption (TA) has not been a major component of the PD workshop, although other forms of PD were emphasised according to them.

The faculty's role in capacity building, as purposeful as it is, endorses Lan's (2014) suggestion, which indicates that professional development in technology for teachers should be viewed as valuable to specialised practice and research needs, geared

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towards addressing curriculum instructional objectives. Likewise, Jaipal-Jamani et al.'s (2018), assessment of "how faculty technology leadership roles build capacity for technology-enhanced teaching" in their study revealed that invitations extended to teachers to participate in capacity building and leadership roles help build their quest to adequately respond to their mandate as technologically and pedagogically informed members of the teaching fraternity capable of inculcating in the learners the desired knowledge and skills to make life more fruitful. Faculty can, therefore, gain exposure to new, handy, and less expensive technological gadgets, as Davis's TAM emphasises, which makes them eager and willing to incorporate these gadgets into their instructions.

It was established that professional development workshops, access to online training resource manuals, pedagogical training, technical support, and sponsorship training for tutors were available during the COVID-19 pandemic, although not explicitly focused on technology usage in instruction per se. However, institutions must continue to support the use of online technology in instruction, even after the pandemic.

4.5.2 Forms and levels of institutional support

The technologically oriented educational gadgets available to the faculty's institution were also inquired about. In the process, participants in the CP category uncovered the following: SJCP suggested that;

> Computers, projector screens, projectors, and marker boards are installed in some lecture rooms to facilitate academic work. The college also has a computer laboratory connected to a Wi-Fi network. Although not the high-speed type, it helps bridge the internet gap to some extent, thereby enabling tutors and students to engage in fruitful technological instruction at certain times, which eases their instructional delivery. So, both tutors and students are accessible to them.

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BCP also mentioned that;

> Computer facilities abound in the college for tutors and trainee teachers at the ICT resource centre. Unfortunately, our low-speed internet facility has not been reliable enough. We are working around the clock to establish an uninterrupted internet facility for academic work. Output equipment, such as printers, is also available to the college for tutors to download recommended and other reference materials for their academic work.

SACP capitulated on that.

> Our school depends on computers and a projector at certain times to make teachers' lesson presentations less tiring. Tutors who use the facility typically require a Wi-Fi internet connection. However, we do not have such a facility as a budding institution.

ACP contends that;

> The college has computers designated for academic use. Unfortunately, a number of them are broken down beyond repair, whilst some are outmoded and not well-suited to the current instructional demands.

AFCP specified that;

> We are in the process of acquiring computers and other equipment for academic work. Some of our sister colleges have been part of the system for quite some time now, and as a result, they are well-equipped technologically. A similar thing cannot be said about us since we are very young.

There was evidence of educational technology facilities, such as computers and Wi-Fi connectivity, in some of the colleges of education investigated, as stated by the SJCP and BCP participants. This indicated the presence of computers and Wi-Fi facilities in their college, which were accessible to both tutors and students. However, the mere presence of technological gadgets in colleges does not necessarily translate into their usage. It was expected that the full realisation of the benefits accrued to these colleges in the study could have been made possible. However, other equally crucial complements, such as the internet, which were necessary to enable online and virtual instruction during the COVID-19 pandemic, were restricted in AFC, AC, and SAC, respectively. As a result, not all the tutors could sustain academic work at the time.

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Consequently, tutors who could not access the internet had their students denied considerable instructional hours during the COVID-19 pandemic.

Views were also solicited from the CT participants in the inquiry on the technological gadgets their respective colleges possessed, and the subsequent expressions were made:

SJCT-1 reported that;

> Our ICT resource room has everything required to facilitate academic research on the Internet. Although some of our lecture rooms are also fitted with projectors and screens. Computers, in the form of laptops or tablets, are provided by the tutors for students to utilise the available facilities. More importantly, our lecture halls do not have Wi-Fi facilities. We could have wished that it were accessible to us there to augment our teaching. However, some of us in this period of COVID-19 do access the internet for our online lessons with the students from the ICT lab at different times.

SJCT-2 notified that;

> Technologically, the college is equipped with computers and internet facilities, which in some instances enable us to carry out some of our academic work that relies on these gadgets conveniently in this era of the COVID-19 pandemic.

BCT-1 endorsed BCP's submission when he said that.

> Although the school has some computer facilities, our system is undermined by unstable Internet access. Although the facility is present, it can disappoint at times, especially during the COVID-19 pandemic, when it is in dire need of helping us with our virtual and online instruction.

BCT-2 confers that;

> The college is privileged to possess 21st-century ICT facilities that are a major driving force behind knowledge acquisition and information dissemination. Although the marker boards are not entirely obsolete, we use them in conjunction with these computer facilities. Some technical support in the area of the IT team that assists with troubleshooting, helpdesk, and chat support

SACT-1 did mention that;

> The college offers pedagogical training and computer facilities. However, their inadequacy means they are not often used to executing class activities. For instance, the few available projectors are always competed for by tutors for lesson presentations at certain times. This

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> hindrance, to some extent, does not motivate us to use them, and as a result, I usually revert to using the marker board to complete the majority of my lessons.

SACT-2 alluded to that;

> Although the college has some ICT equipment, it is grossly insufficient. This has compelled many of us to use the internet and handheld devices to present our lessons. We may continue to rely on our ICT resources for most of our lesson delivery, which is particularly challenging in the COVID-19 pandemic.

ACT-1, in agreement with ACP, pointed out that;

> Although the college has some computer technology facilities meant for academic work, many are broken beyond repair. Incidentally, those available are incompatible with the instructional needs during the COVID-19 pandemic.

ACT-2 minced no different view when he said that;

> Obsolete and broken-down IT gadgets are just some of the characteristics of these facilities in the college's possession. They cannot be relied on for meaningful academic work, so we are restricted from using them in this era of the COVID-19 pandemic.

AFCT-1 also affirmed that;

> The college is gradually equipping itself with ICT gadgets to facilitate academic work. Currently, we have been supplied with yet-to-be-installed and unutilized computer facilities, as the computer laboratory building is still under construction. In my opinion, this situation was likely one of the reasons we were unable to organise virtual instruction for our students during the COVID-19 pandemic.

AFCT-2 justified his colleague's view by saying that;

> The college is confronted with inadequate IT infrastructure facilities. I am, however, reliably informed that, as of the time of your study, some of these educational technology facilities have been supplied to the school but are not accessible yet to the school for usage since the building facility earmarked for the installation of these gadgets is yet to be completed and handed over to the college for use. So, for now, I may be tempted to say that the college is deprived of these gadgets since the supposed one available has yet to come online.

The CT participants reported that some colleges have designated computer and internet facilities to meet their educational technology needs. For instance, SJCT-1 and 2 mentioned the availability and accessibility of digital gadgets in their college. The BCTs also mentioned that they have access to technological resources and

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technical support within the IT support team, which assists with troubleshooting and provides chat support. On the other hand, SACTs revealed that peer mentorship and community practices and tenets are in place at their college. In their case, experienced online tutors were paired with the newly posted tutors to help them acquire best practices and build confidence in online instructional delivery. However, these resources were not fully utilised to capacity due to the low-speed internet facility available to some of them, which sometimes makes the service unreliable. These views of the CTs endorsed what SJCP earlier said, which agrees with the study conducted in South Africa by Chigona (2017) on internet connectivity and access in schools, which found that they face difficulty in procuring high-speed internet, which made connectivity slow and, in some instances, there was no internet at all because it was too expensive to acquire by the schools with their limited source of funding.

These "results suggest that unreliable and low-speed internet connectivity discouraged teachers from using online technology and confirmed what other researchers had noticed" (Handal et al., 2013) about the problems and consequences associated with connectivity in the uncertain times of the COVID-19 pandemic. These suppositions, arising from this discourse, were among the reasons why some tutors failed to incorporate technologically oriented facilities into their instruction. As such, internet connectivity and access to virtual instruction in teacher education, especially during the COVID-19 pandemic, were an inevitable medium that should have received all the necessary attention to ensure that the objectives set for its use were worthwhile. This suggests that for a technology to emerge, it must be both accessible and affordable, enabling mass usage, acceptance, and adaptation.

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Again, the colleges that were underprovided with technological gadgets attribute this partially to the school authorities' inability to replace worn-out or obsolete parts, which hinders their ability to align with software requirements compatible with their academic work. In this instance, the practical application of technology comes under threat. Tiba and Condy (2021) endorsed this assertion put forward by the participants when they postulated that the inability to provide universities and educational institutions in the first and second cycles with the required number of computers and accessories and to update school teachers with the requisite knowledge and skills were the leading cause for the disappointment in implementation and computer application in schools.

Equally, building infrastructure that was supposed to house these technological gadgets, as revealed by the AFC as yet to be completed at the time of the study, also hindered their use of online instructional technology during the COVID-19 pandemic. Hence, their technological needs in their academic work were obstructed. The AFC's inability to engage their trainee teachers in virtual study during the COVID-19 pandemic was an equally important issue because the required facilities were unavailable.

Therefore, it was concluded that although many of the colleges in the investigation were equipped with technology-oriented facilities, such as computers and low-speed internet, to facilitate instruction, others lacked these resources, which hindered online and virtual instruction during the COVID-19 pandemic.

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4.5.3 Reward for faculty in technology usage

On the issue of rewards provided by the CoE in the study to the faculty in Social Studies as motivation for the incorporation of technologically innovative ways into instruction, participants in category CP have this to say:

SJCP maintains that;

> Specifically, we have not implemented any measures to motivate tutors to incorporate instructional technology into their lessons. To say the least, tutors who use varying technologies in their tuition may be self-motivated.

BCP also contends that;

> Faculty members who were rewarded as the best tutors during the congregation have made incorporating technology into their lessons a routine exercise. In some cases, our students' appraisal responses regarding tutors' performance indicate that trainee teachers appreciate their efforts in integrating technology into their lessons.

SACP also mentioned that;

> There has not been any such award scheme in place. However, generally, we reward the academic excellence of both tutors and students for their hard work during the year under review.

ACP articulated that;

> The college does not have a reward system like this. However, at certain times, tutors whose performance is recognised by the college in terms of their students' performance are given awards for their meritorious service during the congregation.

Participant AFCP uttered that.

> As part of the college's responsibilities, tutors who perform well at the end of each academic year are rewarded irrespective of how their instruction was carried out. This award scheme may go a long way to boosting innovation in teaching and their resolve to help their students perform well.

Responses obtained from participants in the CP category indicate that, aside from the general award instituted to recognise performing tutors and students during their respective congregation, there has been no specific award set aside for tutors who utilise educational technology in their instruction. It could have been commendable, with no prejudice, to motivate tutors who have made technology a pivot in lesson

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delivery to encourage other tutors to follow suit. Hence, the tutors' view shared on rewards for technology usage contrasts with Lion and Stark's (2010) comment that when specific tasks or initiatives reach a threshold level of significance, inducements may occur as ways to entice, inspire, or recognise and reward anticipated performance. It can, therefore, be inferred that practical technology innovation in instruction by tutors could be well boosted as rewards are put in place for innovative efforts towards enhancing instructional delivery. Subsequently, the CT participants, on the other hand, had this to say: SJCT-1 mentioned that;

> Our motivation stems from the presence, accessibility, and reliability of technologically oriented facilities in the college, primarily for instruction. Extrinsic material motivation in the implementation of modern technology, however, has not been our desire in the discharge of our duties.

SJCT-2 says;

> It has not been the culture of the college for the school administration to reward those who utilise technology in their teaching. Instead, the interest generated by Generation Z students in our classroom in using technology to thrive has led us to incorporate technology into our lessons for their benefit amid the pandemic.

BCT-1 insists.

> In the yearly congregational meetings, tutors are generally rewarded materially not for using technology in their lessons but for their meritorious work during the period under review.

BCT-2 subscribed to that.

> Incorporating technology in one's class activity is not a sine qua non. However, enhancing delivery when technology is applied has been very motivating. There is no greater reward or satisfaction than imparting knowledge. The college has no award scheme to recognise and reward technology-inclined tutors in their day-to-day lessons during this COVID-19-prone environment.

SACT-1 asserts that;

> The college is not known for rewarding tutors who use technology. I am only aware of the awards given to tutors during the congregation, where trainee teachers are presented with their certificates at the end of their programme.

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SACT-2 says;

> It is not a known feature in the college to see tutors rewarded based on their utilisation of technology in their lessons. Few of us who attempt to use technology when the conditions are favourable do so to get more students to participate in instructional activities in this era of COVID-19.

ACT-1 alluded to that;

> As for AC, using technology in lessons is not a habit among tutors, so the school does not deem it necessary to institute such rewards. However, some of us desire to use technology in our teaching and learning to reap the dividends. That alone could have been more rewarding, in my opinion.

ACT-2 noticed that;

> Rewarding tutors for their application of technology in instruction has not been the norm here at AC. The college could have rewarded us better if the facilities had been in place to integrate technology into lessons. In my opinion, that could have been the best reward for us as tutors.

AFCT-1 says;

> Seeing our school reward tutors for using technology in their lessons could have been a welcome development. Unfortunately, the college has a resource deficiency, so implementing such rewards has not been a priority.

AFCT-2 explains that;

> Rewarding tutors for incorporating technology into lessons is not a common practice in the college, as technological facilities for instruction are scarce, to put it mildly.

The reward for technology acceptance (TA) in instruction has not been a key issue in the colleges investigated. The main reason a significant number of participants cited was the insufficient and, to some extent, the non-existence of the necessary technological equipment required to facilitate technology-based tuition. However, studies conducted by Bozkurt and Ramesh (2020) and Crawford et al. (2020) indicated that as an incentive, tertiary institutions in some parts of the world responded with an emergency digitalisation of teaching, learning, and research. Although the majority of the CP and the CT participants in their submission to the

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question on motivation did indicate that tutors at the colleges of education are not extrinsically explicitly motivated for technology use in their lessons, during the COVID-19 pandemic, the inner desire of tutors intrinsically to perform with technology in instruction spurs them on. This assertion by the CP participants aligns with the findings of Bozkurt and Ramesh (2020) and Crawford et al. (2020). Such initiatives by some school authorities in the study inspired confidence among tutors and students, motivating many to sustain academic work even during the COVID-19 pandemic.

So, taking a cue from the foregoing, tutors who adapted to technology to enhance their instruction did not look to any extrinsic motivation, but rather to the fulfilment of an intrinsic desire —the availability and usability of technological mediums to motivate them to perform their job.

4.6 Presentation of Lesson Observation Data and Analysis

In total, ten tutors participated in the study, with two tutors from each of the five colleges involved. This exercise, conducted at the participating colleges, commenced on March 24, 2021, and concluded on April 5, 2021. The field notes made from the participants' lessons are presented below. The following codes were given to the tutors whose lessons were observed on ethical grounds: SJCT-1, SJCT-2, BCT-1, BCT-2, SACT-1, SACT-2, AFCT-1, AFCT-2, ACT-1, and ACT-2. Subsequently, field notes from the lessons observed are presented in line with the two (2) parts of the observation guide. Part One deals with "the teaching and learning environment as dictated by the COVID-19 pandemic," whilst the second part takes care of "how TPACK is incorporated into lessons during the pandemic". This was done as follows:

SJCT-1's Lesson

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SJCT-1's lesson was observed on Wednesday, March 24, 2021. The observation commenced at 10.15 a.m. and lasted 2 hours at the School's Mozarto Lecture Theatre. Year 2 male and female Social Studies students were well represented via Zoom. The lesson topic was "The Environment."

Part One: Teaching and Learning Environment

The instructional environment was virtual and online, with synchronous sessions conducted via Zoom, as the COVID-19 protocol, which included a temporary ban on in-person tuition, was in effect. Although there were several internet interruptions, partly due to the different locations of participants and poor internet connectivity for the tutor and students, lesson delivery was generally successful. Again, not all members of a class of 35 students could participate due to internet inaccessibility from their respective locations.

Part Two: How SJCT-1 made use of technology in the instance of COVID-19

First Item: Educational technology infused into instruction during the COVID-19 Pandemic

With the aid of a Smartboard, Virtual technological tools like Zoom and a Learning Management System (LMS) were integrated into the observed lesson. The tutor initially began the lesson on Zoom and, about thirty minutes into the lesson, switched to LMS to post group work and other collaborative activities for the students to undertake.

Second Item: Consistency in the application of Instructional technology

There was a high frequency of the tutor's use of online instructional technology in his lesson to overcome the temporal ban on physical interaction between him and the students. The tutor took pride in the manipulation and use of innovative tools.

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Students were equally engaged in this mood as they interacted with each other in a productive activity.

Item Three: Justification for the choice of educational technology in a lesson

The tutor's lesson was more practical. With computer technology at the forefront of teaching and learning, he could interact effectively and purposefully with the students. The learners' virtual participation in the lesson was very encouraging.

Item Four: Tutors' Perspectives of Learners' Reaction to Online Pedagogy of Tutors

The tutor's use of computer technology and effective instructional techniques (such as discussion, collaboration, and lecture) allowed students in virtual class attendance to express their opinions. They demonstrated a high level of competence on the subject matter, making the lesson very interesting. The learners' participation in the lesson was good.

Item Five: Setbacks in technology-infused instruction during the COVID-19 pandemic

Sporadic power cuts, poor internet accessibility, and outdated and faulty computers that were beyond repair hindered the effective use of technological tools to facilitate virtual lessons.

Item Six: System of support for the tutor in instructional technology application

Infrastructure, such as lecture halls, computers, and internet access, was available to the tutor to facilitate his lessons.

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SJCT-2's Lesson

SJCT-2's lesson was observed on 05th April 2021 from 10:00 am to 12:00 pm under "Sanitation." The total number of students in attendance was 45. Twenty-five (25) were males, and twenty were females.

Part One: Teaching and Learning Environment

The Social Studies Lecture Room 2A was where the tutor's online class activity took place, with all the necessary internet facilities connected. The tutor used one of the college's newly acquired, installed, and in-use four Smartboards. By 9:50 a.m., students were ready for the class to begin synchronously, as COVID-19 did not permit in-person tutorials. The students' attendance and participation in the class activities from various locations around the country were very encouraging.

Part Two: How Social Studies tutors made use of technology in the instance of COVID-19 pandemic

First Item: Educational technology infused into instruction during the COVID-19 Pandemic

The tutor utilised digital tools and equipment to enhance instruction and support teaching and learning during the pandemic. With an effective internet facility at his disposal, the online and virtual classes he engaged the students in were quite laudable, as both the tutor and the students in attendance well utilised the Zoom facility.

Second Item: Consistency in the Application of Instructional Technology in a Class

Digital technology tools that facilitated his lesson were used throughout the lesson observation. His insight into manipulating instructional technology tools in his lesson was a good indication that he is very familiar with technology applications in the pedagogical process.

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Third Item: Justification for the choice of educational technology in a lesson

The students' involvement in his Zoom online lessons, which he used as a convenient way to sustain teaching and learning during the COVID-19 pandemic, was sufficient justification for his choice of instructional technology tool in the observed lesson.

Fourth Item: Tutors' Perspectives of Learners' Reaction to Online Pedagogy

From my observation, the ease with which students interact with the tutor during the lesson and comprehend the subject matter under study indicates the tutor's technological expertise.

Fifth Item: Setbacks in technology-infused instruction during the COVID-19 Pandemic.

During the lesson, internet connectivity was interrupted briefly. The low-speed internet connectivity was frustrating for both the tutor and students, as some of their contributions to the class activity were not being transmitted, and some participants in the class activity were unable to establish their expected connection.

Sixth Item: System of support for tutors in instructional technology application

The college provided the tutor with internet access and other related facilities, enabling him to continue instruction during the COVID-19 pandemic.

BCT-1's Lesson

BCT-1's "Global Warming" lesson was observed on Wednesday, March 24th, 2021, from 1.00 p.m. to 3:00 p.m. at the College's resource centre. Twelfth students were connected to the class via Zoom, while 15 of them were in attendance on WhatsApp, collaborating with their colleagues concurrently. In total, 14 of the class attendees were male and 13 were female. The class lasted two hours in the ICT lab on "Global Warming."

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Part One: Class Environment

The students were, as usual, few in number. The activities were conducted synchronously as the school was on recess due to the COVID-19 pandemic. The internet connectivity to the Smartboard to be used for the lesson was set up at exactly noon. The Teaching and learning activity began at 12:30 p.m. and ended at 2:30 p.m. The class began with 10 students, and others continued to trickle in as the lesson progressed, ultimately ending with 27 attendees. Both attendees experienced intermittent breaks, which were partly due to the poor internet connectivity, as students are connected from different locations in the class. In all, the class was quite successful.

Part Two: How BCT-1 made use of Technology in pedagogy in the instance of COVID-19

First Item: Educational technology infused into instruction during the COVID-19 Pandemic

The tutor employed a Laptop and a projector, aided by Zoom technology and internet connectivity provided by the college to facilitate virtual class activity. The lecture was transmitted from the ICT lab, where internet connectivity was centralised. As such, the online discussion the tutor engaged in with the students was successful, despite a few interruptions as students joined the class from various towns and cities. Students' participation in the lesson was very encouraging.

Second Item: Consistency in the application of Instructional technology in a class

The tutor was very consistent in applying instructional technology. After their small group collaborative work, students were asked to make a presentation. This time, internet connectivity was relatively stable, so their images on Zoom appeared well, facilitating easy identification and allowing for a call to respond to questions.

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Third Item: Justification for the choice of educational technology in a lesson

The tutor justified using Zoom for his instruction since it was the most reliable technological tool for the class activity. All students in attendance did not complain about poor Zoom internet connectivity. The student-teachers patronised the discussions.

Fourth Item: Tutors' Perspectives of Learners' Reaction to Online Pedagogy of Tutors

Students support the tutor's ability to vary pedagogical skills in "questioning, brainstorming, discussion, and lecture" to carry out their lesson. Mastery of the subject matter was evident in how students participated in his lessons, utilising appropriate Zoom technological tools.

Fifth Item: Setbacks in technology-infused instruction during the COVID-19 Pandemic

Brief intermittent power cuts during the lecture affected the students' concentration on the class activity. A few students experienced low battery levels on their computers and other handheld devices, causing their lessons to end abruptly. However, one or two could restore their connectivity before the lesson ended.

Sixth Item: System of support for tutors in instructional technology application

A relatively good ICT resource centre for the college was available and in use, and a good lecture theatre and standby generator were available to help sustain power for tutors and students.

BCT-2's Lesson

Observation of BCT-2's lesson took place on Monday, March 29th, 2023, at noon and ended at 2:00 p.m. at the main lecture hall. Twenty students were in attendance, eight females and 12 males. The topic was Democracy. The lesson lasted two hours.

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Part One: **Teaching and Learning Environment**

Comment: The class was online, and the time consciousness of both the tutor and the students was relatively good. The tutor got all his materials, including computer and internet facilities, in place with the support of the college's ICT specialist before the lesson began at 11:00 a.m. Some students who did not have access to laptops or other computer devices accessed the lesson from local internet cafes, where the network was readily available and reliable.

Part Two: How BCT-2 made use of Technology in Pedagogy in the instance of COVID-19

First Item: Educational technology tool(s) infused into instruction during the COVID-19 pandemic

Throughout his lessons, the tutor utilised Zoom to carry out his lessons.

Second Item: Consistency in the application of Instructional technology tool(s)

The entire lesson was conducted via Zoom. The tutor seemed comfortable integrating this technological tool into his lesson.

Third Item: Justification for the choice of educational technology in a lesson During the COVID-19 Pandemic

The tutor felt more comfortable and confident as he navigated the Zoom technological tool in his instructional delivery. The student's level of interest in the lesson was quite laudable.

Fourth Item: Tutors' Perspectives of Learners' Reaction to Online Pedagogy

Learners were very much involved in the lesson, as observed, because the tutor's competence in using technology during the pandemic ensured a different dimension of the students' learning engagement. Their interest was consequently buoyed.

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Fifth Item: Setbacks in technology-infused instruction during the COVID-19 pandemic

The tutor was concerned about poor internet reception due to interruptions caused by rainfall. However, he was able to complete his lesson as scheduled.

Sixth Item: System of support for tutors in instructional technology application

The technical man (ICT resource person) responsible for the school's ICT lab contributed to the sustenance of the virtual instruction despite the interruptions posed by the rainfall, with the initial poor signals.

SACT-1's Lesson

The tutor's lesson was observed on March 29, 2021, at 12:30 p.m. and ended at 2:30 p.m. at the Social Studies Level 200 'C' lecture hall. The total number of students in the online class environment was 30, comprising 18 males and 12 females. The topic was 'Ways of Promoting Savings'.

Part One: Teaching and Learning Environment

By noon, the tutor had set up his virtual class facility to engage student-teachers with his data and a handset in the Lecture Hall. He attributed the unreliable nature of the college's instructional facilities to the use of his tools and equipment. So, he brought up his materials as plan "B", barring any unforeseen circumstances.

Part Two: How Social Studies tutors made use of technology in Pedagogy in the An instance of the COVID-19 Pandemic

First Item: Educational technology infused into instruction during the COVID-19 Pandemic

Instruction was conducted with the support of Zoom for lectures and discussions, enabling interaction with students during activities. Trainee teachers raise their hands to prompt the tutor for his attention to contribute to the discussion. A collaborative assignment was given to students to work in groups to end the lesson.

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Second Item: Consistency in the application of Instructional technology in a class

The tutor consistently applied the technological tools he used for the online lessons, engaging with the students.

Third Item: Justification for the choice of educational technology in a lesson

The choice of instructional technology in the lesson was dictated by its ease of use. It was not difficult to operate.

Fourth Item: Tutors' Perspectives of Learners' Reaction to Online Pedagogy

The tutor's use of digital technology in his instruction, his insightful delivery of the subject matter through lectures and discussions, and the lesson's interactive and comprehensive nature made the students very enthusiastic.

Fifth Item: Setbacks in technology-infused instruction during the COVID-19 Pandemic

Setbacks in technology-infused instruction during the COVID-19 pandemic were observed in areas such as abrupt power outages, poor internet connectivity, and some students' inability to join online classes, partly due to incompatible handsets with the technological tools in use.

Sixth Item: **System of support for tutors in instructional technology application in the era of the COVID-19 pandemic**

Some lecture hall facilities, equipped with numerous computers and other instructional-related ICT devices, were discovered to be located in the lecture hall designated for virtual lessons. The lecture rooms are accessible to the national power grid.

SACT-2's Lesson

SACT-1's lesson went live on Monday, March 30, 2021. The class activity lasted 2 hours, beginning at 10:00 a.m. and ending at noon at S.S. '2A' class, where the Social Studies Unit's IT projector and screen connected to the College's Resource Centre

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were well fortified and set up for instruction. In all, 20 students were connected to the lessons from various locations, as the temporary school closure due to COVID-19 was still in place. The topic addressed was 'Reproductive health'.

Part One: Teaching and Learning Environment

Twenty students attended this virtual class on "Cultural Practices." The lesson was transmitted through the Social Studies 2C class. Both the tutor and the students put in place all the needed facilities. Although the lesson was conducted virtually, students were very attentive in class. This disciplined behaviour made the lesson transpire in a tranquil atmosphere.

Part Two: **How BCT-1 made use of technology in pedagogy in the instance of COVID-19**

First Item: Educational technology infused into instruction during the COVID-19 Pandemic

The tutor is familiar with the Internet, web-based applications, and computer devices that have been integrated into instruction during the COVID-19 pandemic.

Second Item: Consistency in the application of Instructional technology in a class During the COVID-19

Since the class observation also took place during the COVID-19 pandemic, the tutor was conscientiously incorporating various forms of instructional technology into his class activities.

Third Item: Justification for the choice of educational technology in a lesson

The tutor's choice of a particular web-based technology for instruction was influenced by his willingness to make the lesson very real and practical amid the pandemic.

Fourth. Item: Tutors' Perspectives of Learners' Reaction to Online Pedagogy

The tutor's ability to blend technological tools with his teaching methods and subject matter encouraged many students in the virtual class to participate in the lessons.

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Fifth Item: Setbacks in technology-infused instruction during the COVID-19 pandemic

The intermittent termination of the power supply, combined with unstable internet connectivity, occurred at a point that almost immediately disrupted the smooth process of the lesson.

Seventh Item: System of support for tutors in instructional technology application

The tutor is provided with basic equipment, including computers, projectors, low-speed internet facilities, and a whiteboard to create illustrations as he engages the students in instruction.

ACT-1's Lesson

ACT-1's lesson was observed on Tuesday, 30th of March, 2021, at 8.00 a.m. and ended at 10.00 a.m. in the Social Studies Lecture Room 'B'. The topic treated was "Rights and Responsibilities of Ghanaian Citizens". A handful of students (both male and Female) were in attendance. Since the school provided no internet access, the tutor's Laptop and internet data were used to engage the learners in the specially arranged class. The scheduled two-hour class barely lasted for an hour due to poor internet connectivity on his phone, which was mounted on a tripod stand. The topic was 'Economic Integration'.

Part One: Teaching and Learning Environment

Students were unfamiliar with virtual classes, so interactions were not as smooth as expected. Although about two or three students contributed excellently to the class activity, the lesson ended abruptly due to a power cut.

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Part Two: How ACT-1 made use of technology in the instance of COVID-19

First Item: Educational, technological tools infused into instruction during the COVID-19 Pandemic

He tried Zoom at the onset of the lesson, but in the course, he prompted the students he was trying to engage in a virtual lesson to switch to WhatsApp. From then on, his handset, which had some data stored on it, was used as a means of information transmission. This also ended abruptly as students disengaged in the activity when the tutor switched to WhatsApp, which the tutor did not use very often.

Second Item: Consistency in the application of Instructional technology in a class

His usage of instructional technology in the lesson was infrequent and did not last the scheduled duration.

Third Item: Justification for the choice of educational technology in a lesson

It was not quite challenging to access Zoom on his handset.

Fourth Item: Tutors' Perspectives of Learners' Reaction to Online Pedagogy

Few learners in attendance at the tutor's brief class period were very excited about the possibility of attending class virtually.

Fifth Item: Setbacks in technology-infused instruction during the COVID-19 Pandemic

Insufficient internet data on both the tutor's and the students' handsets abruptly ended the virtual class 40 minutes into the 2-hour scheduled lesson.

Sixth Item: System of support for tutors in instructional technology application

The lecture hall facilities are pretty good. The power supply is relatively stable, as the school is connected to the national electricity grid. Although computer facilities are available, they are not supported by internet access.

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ACT-2's Lesson

ACT's lesson was observed on March 29, 2021. It commenced from 3:30 p.m. to 5:00 p.m. at the Social Studies Lecture Room 'B'. The total number of students in attendance via "phone conference procedure" with the tutor's handset and data was 15, consisting of 9 males and six females. The topic treated was "Rights and Responsibilities of Citizens."

Part One: Teaching and Learning Environment

The tutor engaged the students in a virtual class with 15 students in attendance through a "mobile phone conference call" procedure. The school had no internet facilities at the time of the study, so the teacher attempted to bridge this gap by using his handset to engage his students in an online lesson, lecturing and discussing the day's topic with them. The lesson lasted an hour and a half due to network interruptions.

Part Two:

How Social Studies Tutors Made Use of Technology in pedagogy in the instance of the COVID-19 pandemic

First Item: Educational technology infused into instruction during the COVID-19 Pandemic

The tutor utilised an online platform to conduct a lesson with the students, as the college lacked internet access for instructional purposes during the COVID-19 pandemic. However, the tutor decided to use his handset and data during a meeting with the students, amidst network interruptions.

Second Item: Consistency in the application of Instructional technology in a class

The tutor briefly used internet technology in his instruction. However, poor access to the internet using his handset and data did not permit the lesson to travel the entire duration as scheduled.

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Third Item: Justification for the choice of educational technology in a lesson

He justified the poor internet accessibility as his justification for using the "conference call format" to engage the students in the lesson.

Fourth Item: Tutors' Perspectives of Learners' Reaction to Online Pedagogy

However, due to poor internet accessibility, the students were initially hesitant about using technology in their lessons during the COVID-19 pandemic.

Fifth Item: Setbacks in technology-infused instruction during the COVID-19 Pandemic

The low-speed internet accessible to the tutor on his mobile phone was a major stumbling block in conducting his lesson.

Sixth Item: **System of support for tutors in instructional technology application**

The college had basic infrastructure, like lecture halls and computer hardware facilities. However, it did not have access to the Internet to sustain academic work during the study, which took place during the COVID-19 era.

AFCT-1's Lesson

AFCT-1's lesson was observed on 1st April 2021. It commenced at noon and was supposed to end at 2:00 p.m. at the Common Lecture Hall. However, poor attendance, partly due to the unreliability of online classes, ended barely 30 minutes into the scheduled time. Twenty-three (23) students, consisting of 15 males and eight (08) females, began the lesson but ended up with six males and three females. The topic treated was "Resource Development."

Part One: Teaching and Learning Environment

The tutor attempted to engage the students in a collaborative online study, where students living within a five-kilometre radius of each other interacted on a group WhatsApp platform to interact with the tutor within the stipulated lesson duration.

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Feedback was relayed to the tutor by the other groups engaged in similar exercises within the same period, until the lesson ended at exactly 2:00 pm. Both tutors and students used their handsets for interaction.

Part Two: How Social Studies tutors made use of technology in pedagogy in the An instance of the COVID-19 Pandemic

First Item: Educational technology infused into instruction during the COVID-19 Pandemic

Not much can be said about the infusion of educational technology into the tutor's lesson, as the school lacked internet access. The tutor was supposed to employ his handset and data to facilitate the lesson. However, for poor cybernetic attendance, the tutor resorted to WhatsApp and Telegram, where group platforms created for instructional purposes allowed asynchronous access to instruction.

Second Item: Consistency in the application of Instructional technology in a class

The tutors' irregular utilisation of instructional technology was also a problem.

Third Item: Justification for the choice of educational technology in a lesson

The tutor justified his decision to use WhatsApp and Telegram on his handset, given his inability to employ Zoom and other related technological tools, which have been his mainstay as he attempts to sustain his lessons during the pandemic era.

Fourth Item: Tutors' Perspectives of Learners' Reaction to Online Pedagogy of Tutors

However, due to the limitations of technological facilities, the tutor was willing and ready to demonstrate his technological expertise and capacity to sustain teaching and learning during the pandemic in the students' interest.

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Fifth Item: Setbacks in technology-infused instruction during the COVID-19 pandemic

Connecting with the students in an online class took only 30 minutes out of the scheduled 2 hours, partly due to the unavailability of the requisite technological gadgets and tools.

Sixth Item: **System of support for tutors in instructional technology application**

Physical infrastructure, like the lecture room, was present. However, the much-needed internet access and other cybernetic technology required to propel effective virtual pedagogy and instruction were unavailable.

AFCT-2's Lesson

AFCT-2's lesson observation took place on the 1st of April, 2021, from 12:00 to 2:00 p.m., with 12 students, seven males and five females, in attendance. The lesson was conducted asynchronously under a canopy of trees before the school's resource centre on "Resource Development."

Part One: Teaching and Learning Environment

The tutor posted all the necessary information in full view on his tablet via WhatsApp and Telegram group platforms for the students to access and complete the instructions. Some feedback was provided to the tutor during the instruction, while others were implemented outside of it, as students accessed them on the created platforms.

Part Two: How Social Studies tutors made use of technology in the instance of COVID-19 Pandemic

First Item: Educational technology infused into instruction during the COVID-19 Pandemic

The tutor integrated Telegram and WhatsApp technology applications to sustain his lessons during the COVID-19 pandemic, during which physical interaction between him and the students was not permissible.

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Second Item: Consistency in the application of Instructional technology in a class

An irregular application of educational technology was observed in the lesson.

Third Item: Justification for the choice of educational technology in a lesson

Considering the prevailing circumstances, it was the most viable option available to the tutor to sustain instruction.

Fourth Item: Tutors' Perspectives of Learners' Reaction to Online Pedagogy of Tutors

The technological, pedagogical, and content knowledge was evident, but the desirable tools required to make it practicable were the missing puzzle pieces.

Fifth Item: Setbacks in technology-infused instruction during the COVID-19 Pandemic

The absence of the requisite technological facilities and application software was one of the major setbacks that debilitated the smooth integration of computer and internet-assisted instruction during the COVID-19 pandemic.

Sixth Item: **System of support for tutors in instructional technology application**

Lecture room facilities were connected to the national electricity grid. However, workable internet and computer facilities, necessary to ensure the continuity of instruction during the pandemic, were not available in the lecture auditorium.

A cursory review of the lesson observation data clearly shows that it aligns with the interview data collected from the tutors.

4.7 Summary

In this chapter, efforts were made to present and analyse the data collected for the study. In this vein, the first part analyses the demographic characteristics of participants. The second part subsequently analysed the interview instruments administered to the principals and Social Studies tutors of the colleges of education

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involved in the study. The main themes that were addressed based on the research questions comprise the tutor's familiarity with instructional technology, incorporation of instructional technology into lesson delivery, frequency of application of instructional technology, the rationale for the choice of certain instructional technologies in instruction, the reaction of learners on tec of tutors, challenges of faculty in the application of technology in a lesson, institutional support made available to faculty in technology application in the classroom. This chapter also analysed the FGD items for the selected students, which focused on technology and lesson delivery. A sample size of 5 principals, 10 tutors, and 20 students, constituting the FGD participants, was selected from a target population of 5 principals, 30 tutors, and 2,214 students from the colleges selected from the SACE, BCE, ACE, AFCE, and SJCE. The principals and tutors had below-average representation, whilst the student participants constituted more than the average number of the total participants for the study. The study results revealed that Social Studies teachers and trainee teachers employed modern technology with various variations conceptualised in the technological model during the COVID-19 pandemic, despite the inadequacies in the colleges' instructional technology equipment and tools.

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CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.0 Introduction

The preceding chapter (4) presented, analysed, and discussed the results of the study. Immediately following the fourth chapter is Chapter Five, which presents the summary, conclusion, and recommendations. Additionally, it presents the study's limitations and offers suggestions for further research.

5.1 Summary of the Study

The study explored the usage of instructional technology by Social Studies teacher educators in selected colleges of education in Ghana during the COVID-19 pandemic era. Five (5) principals, ten (10) Social Studies tutors, and twenty (20) trainee-teachers who offer Social Studies as their elective programme were sampled from the five (5) colleges of education (SJCE, BCE, SACE, ACE, and AFCE) in Ghana for the investigation.

In all, four (4) research questions were generated out of the objectives to direct the investigation as itemised below:

1. What instructional technologies did the tutors of the colleges in the study employ in their teaching activities during the COVID-19 pandemic?
2. How did the tutors perceive learners' reactions to online technology in pedagogy?
3. What challenges did the tutors face in using online instructional technologies during the COVID-19 pandemic?
4. What institutional support was made available to faculty for the use of online instructional technologies during the COVID-19 pandemic?

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The summary of findings related to the research questions is the following;

5.1.1 R. Q. 1: What instructional technologies did the tutors integrate into their Instructional activities during the COVID-19 pandemic?

Research question 1 is itemised as follows.

i. The study found that, although many lecture rooms were equipped with Wi-Fi, computers, projectors, and Wi-Fi network facilities, these facilities were often unreliable. So, this situation compelled the tutors to rely on their data, portable laptops, tablets, and smartphones to access Zoom Video Conferencing, LMS, Skype, Google Meet, Google Classroom, YouTube videos, and WhatsApp technological tools as a response to instructional sustenance in a synchronous and asynchronous collaboration, and virtual process in the COVID-19 period. This is a testament to the acceptance of Davis's TAM and adaptation of Rogers's IDT in the course of work, as some tutors integrate technologically innovative gadgets into their instruction to offset school closures.

ii. The minimum range of 2 to the maximum of 18 years in utilising computer technology in instruction indicates the tutors' consistency and rich experience in the actual usage and adaptability to technology acceptance and adaptation (TAA).

iii. Except for a few of the tutors who have, at least, for once, had the privilege of re-training on technology applications in instruction on Camtasia, LMS, Zoom, and Skype, there was a clear indication that tutors had not been given any specific on-the-job training on how to use technology to facilitate their teaching and learning. Nevertheless, they have had some general PD T-TEL on a campus training programme, not technology-based instruction.

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iv. Online instructional technology was intensely integrated into the tutors'

v. Instruction to sustain academic work during the COVID-19 pandemic

vi. No specific period was designated for using online instructional technology in the tutors' lessons. Instead, the tutors' choice of online technology depends on the topic and the objectives they intend to achieve for the lesson.

vii. The teacher-trainees were very responsive to using technology in instruction. This enthusiasm is evident whenever a new technological tool, with which the trainee teachers are unfamiliar, is introduced in a class activity. So, students welcome the utilisation of technology in instruction due to the immense benefits they acquire from such an instructional delivery process.

Generally, all the tutors consistently used LMS, Google Meet, Zoom Video Conferencing, and WhatsApp online technological tools in their lessons during the COVID-19 pandemic.

5.1.2. R. Q.2: How do the tutors perceive learners' reactions to using online Technology in pedagogy?

The findings for research question 2 are as follows;

i. Tutors' knowledge of pedagogical practices that enhance technology adaptation (TA) in instruction impacted their desire to sustain instruction during the COVID-19 pandemic. Their practical knowledge of how various teaching methods, techniques, and strategies are effectively blended with technology in lesson delivery during the pandemic was instrumental in sustaining their academic work during the phase of school closures.

ii. The tutors' practical use of LMS, Google Meet, Skype, and WhatsApp

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technological tools, combined with content, teaching methods, and techniques, during the COVID-19 pandemic, is a manifestation of their competence in online technology instruction and the reason for students' mass participation, regular attendance, and punctuality in online classes.

iii. It was found that in colleges with a reliable electricity supply, well-maintained and up-to-date computers, and access to technology training, the utilisation of technology, content, and methods in online instruction led to the efficient use of technological tools.

iv. A conclusion was drawn that virtual and online field trips, discussions, lectures, and presentations characterised some of the techniques tutors employed with the subject matter in their transition to virtual and online instruction during the COVID-19 pandemic.

v. It was revealed that emergencies alter how technology is used in specific instructional activities, rather than merely selecting a technological tool for a particular piece of content at a given time.

vi. The Social Studies tutors have had pedagogical training in online technological tools in their formal education and, therefore, utilised some of them during the COVID-19 pandemic to sustain their instruction in the absence of in-person classes.

vii. The results revealed that the trainee-teachers attributed their tutors' control of the content and technology integration in their instruction to their competence and the presence of some of the requisite facilities in their school.

viii. The study further revealed that technology, content and pedagogical techniques are the complementary concepts utilised in instruction by tutors

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during the COVID-19 pandemic and were the ideal procedure that Social Studies tutors were equipped with in their resolve to function effectively in their instructional responsibilities

ix. It was discovered that tutors utilised synchronous and asynchronous online instructional modes in their lessons during the COVID-19 pandemic.

Generally, learners' regular and punctual attendance at online classes, successful completion of assignments, and active participation in online class discussions were all testaments to the learners' approval and enjoyment of online technology in pedagogy during the COVID-19 pandemic.

5.1.3 R. Q. 3: What challenges did the tutors face in the use of online instructional technologies during the COVID-19 Pandemic era?

The Findings for Research Question 3 are presented as follows.

i. The major stumbling blocks that Social Studies teacher-educators encountered during the COVID-19 pandemic were inadequate lecture infrastructure, abrupt power cuts, unreliable low-speed internet access, insufficient instructional technology gadgets, and inaccessibility to instructional technology retraining programs to update them. The study revealed that these stumbling blocks hindered the smooth continuation of instruction during the COVID-19 pandemic.

ii. The study's outcome revealed that ineffective supervision of technology-oriented lessons by the educational authorities responsible for such exercises also affected the smooth integration of technology into instruction. GTEC and the internal college authorities made little effort to inquire about the state of technology usage in instruction by tutors during the pandemic, likely due to their awareness of the inadequacy of such college facilities.

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The results generally revealed that some of the tutors in the investigation were unable to utilise computer equipment meant for technology-related lessons to capacity, as they were confronted with outdated, faulty computers, sporadic power cuts, and poor internet accessibility.

5.1.4 R. Q. 4: What institutional support was made available to faculty for the usage of online instructional technologies during the COVID-19 Pandemic era?

The summary of findings related to research question 4 is itemised as follows:

i. PD workshops, technical support, pedagogical training of tutors, and online technology tutorials to facilitate online instruction during the COVID-19 pandemic. A lot remains to be done.

ii. Although a good number of the colleges in the study were endowed with online technology resources, technical support, a community of practice, and a relatively high level of institutional support to facilitate instruction, colleges were handicapped in that respect during the COVID-19 pandemic. Indeed, the COVID-19 pandemic presented a valuable opportunity for colleges to transition to virtual and online distance instruction, enabling them to sustain academic work.

iii. Institutional rewards for instructional technology-oriented tutors were unavailable, but some tutors were motivated intrinsically by the available and usable technological mediums to virtually engage their students during the period of the COVID-19 pandemic

Generally, some level of infrastructure, computers, internet access, payment of fees for short-term training programmes, and per diems, though not sufficient, were made available to faculty in support of short-term training on technology integration into instruction.

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5.2 Conclusion

Grounded on the findings, the following conclusions were drawn:

Generally, instructional activities did not halt during the pandemic since many tutors felt that online instructional technology tools were useful in sustaining academic work.

Additionally, it is not just the use of online technology by tutors that sustains academic work during the pandemic, but also how consistently these tools were integrated into the instructional process. It could be inferred from the conclusion that tutors' ability to adapt to online instructional technology tools helped them continue academic work during the pandemic. It could also be inferred that regular use of online technology tools in instruction was crucial for sustaining academic work. Moreover, the effectiveness of online technology in the instructional process is central, but not its mere use in instruction. A reflection on these inferences suggests that the pandemic underscored the need for educators to be prepared to incorporate technology into their instructional practices. The significance of online instructional technology tools in facilitating academic continuity during the COVID-19 pandemic cannot be downplayed. Therefore, the experience gained by tutors during the pandemic can inform future instructional practices and boost resilience in the event of disruptions.

Another conclusion was that the lack of training in using specific online instructional technology tools among some of the tutors, among other factors, influenced tutors' choice of online instructional technology. It could also be inferred from this conclusion that a lack of training in specific online instructional technology tools can limit tutors' ability to utilise them effectively. Also, tutor capacity building by investing in training and professional development for tutors is indispensable to

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improve the utilisation of online technology. Another inference that can be drawn from the above conclusion is that tutors' selection of online instructional tools is influenced by their familiarity and level of comfort with these tools. A reflection on the conclusion highlights the need for tutor professional development, institutional support for up-to-date technological tools, and the positive or negative impact that the utilisation of technological tools can exert on students' learning, depending on their effectiveness, cannot be underestimated.

Moreover, it was concluded that although tutors' use of online technology in pedagogy was approved and enjoyed by the students, tutors' continuous utilisation of online technology in future engagement, alongside in-person instruction, depends on the sufficiency, accessibility, and usability of online instructional technology equipment and tools. It can also be inferred from this conclusion that tutors' continuous use of online technology in future instructional practices depends on having sufficient, accessible, and user-friendly equipment and tools. Again, institutional investment in reliable, accessible, and usable online instructional tools to support sustained learning is significant. Furthermore, a reflective thought on the conclusion involves long-term planning, allocating sufficient resources for online instructional tools, and striking a balance between online and in-person instruction.

Once again, not only were the Colleges unable to utilise computer equipment and tools to their full capacity, but they were also hampered by outdated facilities, faulty computers, sporadic power cuts, poor internet accessibility, and inadequate technology-oriented lesson supervision, which consequently betrayed their unpreparedness for online instruction. Therefore, fulfilling the technological needs of some of the colleges during the COVID-19 pandemic became a tall order. The

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inferences drawn from this conclusion were that some infrastructural challenges, including faulty equipment and unreliable internet access, hindered the effective use of online technology in instruction among the colleges. Again, colleges were unprepared for online instruction, as the pandemic's eruption left them unawares. It can also be inferred that multiple challenges, including power outages and inadequate supervision, exacerbated the difficulties faced by the colleges. A reflection on the conclusion highlights the need for colleges to prioritise the modernisation of their internet connectivity, plan for contingencies to address potential challenges, ensure continuity, and provide adequate technology support and supervision of work to ensure effective online teaching and troubleshooting.

Additionally, there was evidence of institutional support from the colleges for tutors in terms of technology infusion into instruction, including fee payment and per diem for tutors attending short courses, as well as provision of technological gadgets to facilitate instructional delivery. However, the institutional support made available to the faculty in technology application in instruction during the COVID-19 pandemic was very puny and worked against the full realisation of TAA in the Social Studies instruction in the colleges in the investigation. It could also be inferred that, despite the availability of some institutional support, support for tutors to fully enable tutors' utilisation of technology in instruction during the pandemic was insufficient. Hence, the limited impact hindered the practical realisation of technology-assisted instruction in Social Studies. This indicates the need to provide more comprehensive support to tutors to facilitate the successful utilisation of technology. This conclusion shows that providing adequate resources, support for strategic target training facilities, and technical assistance is essential for colleges' online instruction, even in regular times.

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Therefore, insufficient support can restrain the potential benefits of technology utilisation and affect instructional outcomes.

In conclusion, the study highlights the resilience and adaptability of tutors in leveraging online instructional technology tools, such as ZVC, WVC, Google Meet, Google Classroom, and LMS, to sustain academic work during the COVID-19 pandemic. Despite encountering challenges, tutors demonstrated relative success in utilising these tools, underscoring the potential of technology to facilitate continuity of learning in times of crisis. The findings suggest that investing in digital infrastructure, providing ongoing support and training for educators, and fostering a culture of innovation can enhance the effectiveness of online instruction and promote academic resilience in the face of unforeseen disruptions among the CoE in Ghana.

5.3 Recommendations

The following recommendations were made based on the key findings and conclusions drawn.

1. The study fundamentally recommends that the local Ghana Education Service (GES), in collaboration with the colleges' administrators, prioritise technological innovations, motivate and engage tutors at the CoE in capacity-building on the utilisation of digital tools in pedagogy.
2. The CoE leadership must encourage tutors to integrate new and relevant digital instructional methodologies into their curricula to ensure dynamism in the tutors' efforts to justify the use of digital technology tools in their lessons. These digital approaches can enhance trainee teachers' understanding of lessons, skill acquisition, and adaptation to digital concepts as they actively participate in the instructional process.

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3. The management of the CoE should ensure that sufficient, modern, and operational digital technology facilities are made available to Social Studies teacher educators and their students, making online instruction the centrepiece of their instructional delivery from the designated laboratory for online activities.
4. The administrative bodies of the colleges should provide their institutions with the requisite physical infrastructure, and the appointment of technology-imbued tutors is required to facilitate instruction in the discipline. It is expected that the management of higher education institutions will be informed of and take seriously the technological needs of a modern instructional environment within their institutions to support virtual and online instructional delivery, even amid in-person interactions between teachers and students.

5.4 Limitations to the Study

It is worth stating that a study cannot be completely flawless. Consequently, recognising the shortfalls of this study reflects honesty and transparency and further indicates my hold on the study conducted. Hence, the limitations manifested as follows;

The setting of the study was SJCE, BCE, SACE, ACE, and AFCE in the former Brong-Ahafo Region (now Ahafo, Bono, and Bono East Regions) of Ghana. The focus was on Social Studies tutors' use of online technology in instruction during the COVID-19 pandemic. The main concerns raised and the results obtained have implications for Social Studies teacher education and the framework of Ghana's education system, as well as elsewhere. Therefore, the extent of coverage limits the

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generalizability of the findings, as they do not encompass all teacher-educators and all disciplines in the colleges of education in Ghana.

As a qualitative study, the sample size (35) from which data were collected was quite small, but the data acquired for analysis were quite large. Therefore, recording, transcribing, analysing, and discussing the data from interviews, FGD of participants, and observation notes was quite a challenge. In effect, completing such a task within the time frame of an academic study, bounded by time, posed a significant challenge to completing the investigation as scheduled.

Also, there were some stumbling blocks at the data collection stage of the investigation. The COVID-19 pandemic occurred during the data collection stage, when GTEC temporarily closed colleges of education and did not permit physical interactions between the interviewees and me. I overcame the problem by conducting Zoom Video Conferencing, Skype, and WhatsApp Video and Text Messaging interviews from various sites and locations, both within and outside the respective colleges, as scheduled with the study participants. Coupled with the distance was the issue of the participants' inability to adhere to the Zoom interview schedule. Unforeseen circumstances arose along the way, and some participants occasionally required the interview time to be rescheduled. To some extent, these occurrences slowed the pace of data collection and altered the original completion date for the interviews. The subsequent rescheduling, in a way, enabled me to take a second look at my interviews and adjust the time spent on each participant during data collection, which aided me in completing the interviews, although not as originally scheduled, but within a more manageable timeframe.

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Last but not least, every researcher hopes to acquire a certain level of responses from the participants to generate more credible and usable information. However, these expectations were not fully met during the data collection process for analysis. Although the idea of limits is to ensure that the study is not outdone, it particularly aids me in ensuring the effective utilisation of resources available for the study during the defined period.

5.5 Contributions of the Study

The findings of the study contribute to theory, policy, knowledge, and practice in the following ways:

Theoretically, the study contextualised technology utilisation by providing insights into the challenges and opportunities of integrating technology in teacher education in Ghana. Therefore, when necessary, it provides insights into the tutors' adoption and adaptation in a similar context relating to the online instructional environment. Consequently, it provides theories of teacher professional development and resilience under such circumstances.

Again, it boosts the identity and agency of teachers at the colleges. In this situation, the study examined how teachers' sense of identity and agency evolved during the pandemic, highlighting the complex interplay between teacher beliefs, practices, and context.

Thirdly, it enhances the understanding of tutor perspectives by shedding light on tutors' experiences, attitudes, and perceptions of online instructional technology and exposing theories of technology acceptance and usage.

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Methodologically, the study helped develop a context-specific framework, leading to a conceptual model for implementing online instructional technology in the CoEs in Ghana, taking into account the local context and challenges.

It also informs how future research can be conducted, identifying areas for further research and thereby contributing to the development of a research agenda on technology utilisation in teacher education in Ghana and beyond.

The research's findings will inform education policymakers about the effectiveness of ERT, highlighting areas that need improvement and opportunities for innovation. This will equip policymakers and interest groups with further information needed to make informed decisions that enhance innovative processes and give teacher education the boost it requires to achieve its rightful position in academia, particularly in its training programmes.

Secondly, it revealed what needs to be done to support teachers' well-being in executing their roles. In this regard, the study identified strategies necessary to support teacher well-being and mental health during times of crisis, informing policy initiatives aimed at promoting teacher retention and job satisfaction.

This study's contribution to practice also identifies how teacher education programmes can be improved. The study's findings can serve as a valuable source of information to inform the design and delivery of teacher education programs, ensuring that teachers are well-prepared for the challenges of online and blended instruction.

Lastly, the findings of this research will help enhance teacher practice as a facilitator in an instructional environment. In this instance, the study's findings identify the practical strategies necessary for teaching and learning in times of disruption, providing valuable insights for teachers and other educators.

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In conclusion, by exploring the experiences and challenges of tutors in Ghana, this research contributes to a deeper understanding of technology utilisation in teacher education, ultimately informing theory, methodology, policy, practice, and future research.

5.6 Suggestions for Further Study

The study's setting was the former Ahafo, Bono, and Bono East Regions of Ghana. I suggest that future studies consider, if not all, a greater number of regions in Ghana through a national survey, not only during uncertain periods but also in typical environments, to arrive at a more informed generalisation of the findings.

This qualitative study collects data from observation, interviews, and FGD items. To some extent, the participants' responses and results show a given level of distinction. Ideally, the mixed method, which permits both text and statistical analysis and draws its strength from multiple forms of data on all possibilities regarding the study, could be adopted for future studies on the topic.

It is suggested that future researchers consider conducting physical contact on a face-to-face basis between the researcher and the source of primary data (participants) to closely observe in-person tutorials and effectively collect data, thereby avoiding probable data distortion from surrogate research assistants. Establishing direct contact with the interviewees, particularly in the event of any emergencies, will provide the researcher with more insight into the data obtained.

To establish a more rigorous conclusion, the nuances and complexities of the data collection processes and analysis should be explored.

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APPENDICES

APPENDIX "A"

Letter of Introduction

UNIVERSITY OF EDUCATION, WINNEBA
FACULTY OF SOCIAL SCIENCE EDUCATION
DEPARTMENT OF SOCIAL STUDIES EDUCATION
P. O. Box 25, Winneba, Ghana
socialstudies@uew.edu.gh
+233 (020) 2041096

Your Ref.: SSE/SM.1/VOL.1/301

Date: 1st April, 2021

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

LETTER OF INTRODUCTION

We write to introduce Mr. Philip Ofosu, a PhD Social Studies student from the above named Department to your outfit.

As part of the requirement for the award of PhD degree, he is undertaking a research on the topic "*Online Teaching By Social Studies Tutors In Colleges Of Education In The Ahafo, Bono And Bono East Regions Of Ghana During The Covid-19 Pandemic Era*". We will be most grateful if you could grant him permission to undertake the study including collecting data.

We count on your cooperation.

Thank you.

Yours faithfully,

Ms. Millicent Biney
for: Ag. Head of Department

University of Education,Winneba http://ir.uew.edu.gh

APPENDIX "B"

Interview Guide and FGD Guide

UNIVERSITY OF EDUCATION, WINNEBA

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF SOCIAL STUDIES EDUCATION

INTERVIEW GUIDE AND FOCUS GROUP DISCUSSION FOR COLLEGES OF EDUCATION IN GHANA

Background Information

This interview guide and focus group discussion (FGD) items are being administered to respondents on the topic "Online teaching by Social Studies Tutors at Selected Colleges of Education in Ghana during the COVID-19 Pandemic Era".

The primary purpose of this study is to explore the online teaching by Social Studies tutors at selected colleges of education in Ghana during the COVID-19 pandemic. The items are scheduled into two (2) parts with six (6) thematic sub-sections from the research questions. Part one (1) requires participants to provide their demographic data. The second part (2) is the interview schedule for the principals, tutors, and a scheduled FGD to be responded to by the sampled student participants. The participants' responses to the interview items and the FGD were recorded, transcribed, and analysed.

Participants were assured that all responses to the interview and the FGD items would be treated with the utmost confidentiality it deserves for this doctoral thesis, which is in partial fulfilment of the award of a Doctor of Philosophy degree in Social Studies Education.

Please provide verbal responses to the items as indicated.

Part 1: Demographic Data

Please tick (٢)

1. Identity of participants: Principal [ ] Tutor [ ] Student [ ]

2. Period in the college…….....

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Part 2: **These Interview items are to be answered by the Principals and Social Studies Tutors of the Colleges of Education in the Study Area.**

Section (i): ***Incorporation of Instructional Technology into Lessons During the COVID-19 Pandemic***

3. Can you please indicate some instructional technologies available to your institution?

Response: …….

4. When did you first start using the technology in question?

Response: ……..

5. What specific on-the-job training is on how to use specific instructional

What technology have you used to facilitate your teaching and learning?

Response: ……...

6. Why do you apply instructional technology in your instruction?

Response: ……

7. What period within your instructional delivery do you use instructional technologies?

Response: …….

8. How is the response of the students to the application of the intended

Instructional technology in the lessons exhibited?

Response: ……

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Section (ii)(a): How do the tutors perceive learners' reactions to using online Technology in pedagogy?

9. How do you understand technology in pedagogy?

Response: ……..

10. How do Social Studies tutors exhibit their knowledge of instructional technology become evident in this period of the COVID-19 Pandemic?

Response: ……..

11. How does a tutor utilise adequate knowledge of technology, content, and teaching methods/techniques in some instances of instruction?

Response: …….

12. Indicate the teaching and learning techniques used when technology and content are combined during instruction.

Response: ……

13. Explain the specific kind of content taught and the technology employed.

Response: ……

14. What pedagogical tutoring have you had during or after your formal education?

Response: ……

Section (ii)(b): Focus Group Discussion items for the selected students on *technology utilisation and Lesson Delivery*

15: What is your view on the tutor's control of the contents and technology utilisation in Social Studies lessons during the COVID-19 Pandemic?

Response: ……..

17. How does a tutor incorporate technology, content and pedagogy in instructional processes amid COVID-19 Pandemic?

Response: ……..

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18. What online instructional modes do the tutor(s) use during the COVID-19 pandemic?

Response: ……..

Interview items for Principals and Faculty

Section (iii): ***Challenges of Faculty in the Application of Online Technology in Lessons***

19. How do the stumbling blocks you have encountered in incorporating technology in your lessons manifest?

Response: ……..

20. How about supervision by the educational authorities on whether the technology In use conforms to the dictates of the curriculum in this era of COVID-19 Pandemic?

Response: ……..

Section (iv): ***Institutional Support made available to Faculty in Technology Application In Instruction During the COVID-19 Pandemic?***

21. What educational technological gadgets does the school have?

Response: ……..

22. How does the reward to faculty by the institution reflect the incorporation of instructional technology in their lessons?

Response: ……..

Appreciation: Thank you for your time and contribution to my academic work.

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APPENDIX "C"

Lesson Observation Guide / Checklist for Colleges of Education Tutors

UNIVERSITY OF EDUCATION, WINNEBA

FACULTY OF SOCIAL SCIENCES EDUCATION

DEPARTMENT OF SOCIAL STUDIES EDUCATION

Introduction

This lesson observation process is planned to observe the lessons of the sampled Social Studies tutors in the selected colleges of education in Ghana. Its main goal is to investigate the online teaching practices of Social Studies tutors in selected colleges in Ghana during the COVID-19 pandemic. Its purpose is purely academic. The anonymity of your identity and the confidentiality of the information provided are deeply respected and assured.

Date…… Time of Observation……

Level Taught …… Students in Attendance…….

Subject…… Topic Treated....……...

Number of Males…… Number of Females……

Time Lesson Began……. Time Ended……

Tutor's Lesson

Comment(s):……

……

Part One: Teaching and Learning Environment

Comment(s):……

…..……

……....……

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Part Two: How Social Studies tutors made use of online lessons in the instance of COVID-19 Pandemic

First Item: Educational technology infused into instruction during COVID-19 pandemic

Comment(s):……

……

Second Item: Consistency in the application of Instructional technology in a class

Comments(s):……

……

Third Item: Rationale for the choice of Instructional technology in a lesson

Comment(s):……

……

Fourth Item: Tutors' Perspectives of Learners' reaction to online pedagogy of tutors

Comment(s):……

……

Fifth Item: Challenges of Faculty in the Infusion of Online Technology into Instruction during the COVID-19 pandemic.

Comment(s)……

……

Sixth Item: System of support for tutors in instructional technology application during the COVID-19 Pandemic?

Comment(s):……

……

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APPENDIX "D"

Interpretation of Codes of Participants in the Study

Abbreviated Code	: Meaning of the Abbreviated Code
AC	Atebubu College
ACP	Atebubu College Principal
ACS-1	Atebubu College Student One
ACS-2	Atebubu College Student Two
ACS-3	Atebubu College Student Three
ACS-4	Atebubu College Student Four
ACT-1	Atebubu College Tutor One
ACT-2	Atebubu College Tutor Two
ACUS	Atebubu College Unified Students
AFC	Al-Farouk College
AFCP	A-Farouk College Principal
AFCS-1	Al-Farouk College Student One
AFCS-2	Al-Farouk College Student Two
AFCS-3	Al-Farouk College Student Three
AFCS-4	Al-Farouk College Student Four
AFCT-1	Al-Farouk College Tutor One
AFCT-2	Al-Farouk College Tutor Two
AFCUS	Al-Farouk College Unified Student
BC	Berekum College
BCP	Berekum College Principal
BCS-1	Berekum College Student One
BCS-2	Berekum College Student Two
BCS-3	Berekum College Student Three

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BCS-4	Berekum College Student Four
BCT-1	Berekum College Tutor One
BCT-2	Berekum College Tutor Two
BCUS	Berekum College Unified Students
CP	College Principals
CS	College students
CT	College Tutors
SAC	Saint Ambrose College
SACP	Saint Ambrose College Principal
SACS-1	Saint Ambrose College Student One
SACS-2	Saint Ambrose College Student Two
SACS-3	Saint Ambrose College Student Three
SACS-4	Saint Ambrose College Student Four
SACT-1	Saint Ambrose College Tutor One
SACT-2	Saint Ambrose College Tutor Two
SACUS	Saint Ambrose College Unified Students
SJC	Saint Joseph College
SJCP	Saint Joseph College Principal
SJCS-1	Saint Joseph College Student One
SJCS-2	Saint Joseph College Student Two
SJCS-3	Saint Joseph College Student Three
SJCS-4	Saint Joseph College Student Four
SJCT-1	Saint Joseph College Tutor One
SJCT-2	Saint Joseph College Tutor Two
SJCUS	Saint Joseph College Unified Students
UCES	Unified Colleges of Education Students