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The Role of Digital Technologies in Higher Education during the Coronavirus Pandemic: Insights from a Ghanaian University

Ebenezer Agbaglo[1,2*], **Emmanuel Mensah Bonsu**[1]

[1]Deparment of English, University of Cape Coast, Cape Coast, Ghana
[2]Africa Interdisciplinary Research Institute, Ghana
E-mail: ebenezer.agbaglo@stu.ucc.edu.gh

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Abstract: The emergence of the coronavirus disease saw the closure of schools as well as a hitch in the application of the face-to-face approach to classroom interaction. During this period, digital technologies presented a useful alternative. In the present study, we examined the use of digital technologies among students of the University of Cape Coast during the coronavirus pandemic. The study relied on a qualitative research design involving interviews with 10 students. The findings revealed that students used mainly mobile phones and laptops to facilitate learning during the pandemic. It was also found that these devices had essential software such as Moodle, Zoom, WhatsApp, and YouTube installed on them, which enabled interactions between course instructors and students. Again, we found that these technologies were useful in helping students develop information-seeking, typing and research skills. However, the use of these devices came with some challenges, such as the breakdown of the machines, expensive data bundles, and unfamiliarity with the operational procedures of software. Students adopted various coping strategies in dealing with these problems. Based on these findings, the study highlighted some implications for practice.

***Keywords*:** challenges, coping strategies, coronavirus pandemic, digital technologies, Ghana, higher education

1. Introduction

The outbreak of the coronavirus (COVID-19) disease was evidenced in 2019 and it later spread to affect all countries in the world by 2020. Several measures and precautionary protocols were put in place by the World Health Organisation (WHO) to curb its spread. The first case in Ghana was recorded on 12th March 2020 (Gyasi, 2020). Following the heightened concerns, the Government of Ghana implemented interventions to control the spread and potential introduction of new cases. One of these interventions was the initiation of a the traditional lockdown which affected educational institutions in Ghana.

Following the disruption of traditional teaching and learning methods that were centred on face-to-face and in-class interactions (Maphosa, 2021), stakeholders enacted alternatives to continue education. Principal among these alternatives was the application of digital technologies. Lie et al. (2020) account that the introduction of digital technologies for learning was a less-preferred option to the traditional face-to-face teaching and learning before the

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COVID-19 pandemic. That is, before the advent of the pandemic, most educational institutions were acquainted with face-to-face interaction rather than adopting digital technologies. Nonetheless, Zhu and Liu (2020) state that digital technologies have transformed the traditional teacher-centred classroom to learner-centred interaction, participation and information-sharing. Digital technologies such as the mobile phone have provided innovative means to rejuvenate teaching and learning (Papadakis & Kalogiannakis, 2017). Through digital technologies, there is unlimited access to information, worldwide communication, and quick feedback to facilitate self-learning (Papadakis, 2018; Zakaria & Khalid, 2016). According to Wahab (2020), the educational system must embrace digital technologies to promote teaching and learning. Bansah and Agyei (2022) reveal that digital technologies have been exalted to be useful, but integrating them into teaching and learning is still a challenge.

Confining teaching and learning in the face-to-face instruction has been demystified through the outbreak of COVID-19, demonstrating that education and digital technologies are interrelated (Wargo et al., 2020). Digital technologies have chalked numerous successes in the educational domain. Porter et al. (2015) conducted a study in Ghana, South Africa, and Malawi which revealed that mobile phones improve the learning opportunities for learners and help them in discovering their potential. In examining the delivery of education in the COVID-19 era, Crawford et al. (2020) report that European institutions have deployed asynchronous and synchronous digital technologies to promote teaching and learning. Also, Mailizar et al.'s (2020) study revealed that in Indonesia, digital technologies were impactful when educational institutions were closed down during the outbreak of COVID-19. Lie (2020) reports that some educational institutions were already using digital technologies; hence, COVID-19 did not affect them. However, the worst situations were with teachers who lacked the potential in using digital technologies.

It has been revealed that digital technologies have a great impact on teaching and learning (Crawford et al., 2020; Masterson, 2020; Mouchantaf, 2020; Wekerle et al., 2020; Zhou et al., 2020). Examples of such digital technologies are mobile phones, audio-visual technologies, computers, online meeting apps, Learning Management Systems (LMS), laptops, social media, radio, smart television, and the Internet. However, the question of the impact of digital technologies is not what types are used, but how they are used (Wekerle et al., 2020). Several advantages of digital technologies have been documented in the literature which pertains to supporting the pedagogies that focus on students' collaborative learning (Marcus-Quinn et al., 2019) and helping students to acquire digital skills (Papadakis, 2016). The best practices for digital technologies in education are yet to be explored (Petrie, 2020).

Ghana, as a developing country, has evidenced less of the impact of digital technologies during the COVID-19 pandemic. Desired research findings of this problem do not exist, which presents a knowledge gap. This unexplored gap is important and worth-investigating in the context of Ghana. Given this background, the study aims to examine the perceived impacts of digital technologies in promoting teaching and learning in Ghana during the COVID-19 pandemic. The study will reveal what technologies were used and how they were used in promoting teaching and learning. This becomes significant in fostering measures to support such technologies for future purposes. Also, the study will report challenges and coping strategies associated with the utilisation of digital technologies. Recommendations will be provided to guide educational stakeholders in policy development. The study offers innovativeness in instigating further studies on digital technologies and COVID-19. The study is informed by two research questions:

1. What are the effects of the digital technologies used in promoting teaching and learning in Ghana during the COVID-19 pandemic?

2. What strategies were devised to meet the challenges associated with using digital technologies in promoting teaching and learning in Ghana during the COVID-19 pandemic?

2. Literature review

This portion presents a review of relevant studies that help to flesh out the aim of the study. The study reviews studies on the need for digital technologies (Antwi et al., 2018; Hajara & Bukari, 2017; Goh & Sigala, 2020), students' use of digital technologies (Blackwell et al., 2013), and barriers to adopting digital technologies in teaching and learning (Abbas, 2016; Liu et al., 2020; Siyam, 2019). The review funnels the attention to studies on the significance of digital technologies to justify the conduct of the study.

2.1 *Effects of digital technologies in promoting teaching and learning*

Antwi et al. (2018) highlight that the use of digital technologies has become characteristic of education. Hajara and Bukari (2017) trace the introduction of digital technologies in education by highlighting that the key aims are to:

> Transform Ghana into an information and knowledge-driven ICT literate nation; modernize Ghana's Educational System using [digital technologies] to improve and expand access to educational training and research resource and facilities; improve the quality of education and training and make the educational system responsive to the needs and requirements of the economy and society with specific reference to the development of the information and knowledge-based economy… (p. 2).

Goh and Sigala (2020) add that the need for digital technologies develops an open and collaborative pedagogical model which extends instructional models beyond the classroom. LMSs have been strongly supported in the literature (Bansah & Agyei, 2022; Goh & Sigala, 2020), given that they provide innovative means of collaboration. Štemberge and Konrad (2021) support the need for digital technologies because they infuse positive attitudes into learners. Goh and Sigala (2020) add that instructors can migrate their content into digital formats to facilitate teaching and learning. This assertion is supported by the current study because the availability of digital learning materials and teaching methods offers a flexible study and practice allowing students to study at their own pace. Lim et al. (2020) finalise that digital technologies enhance the quality of education with advanced methodologies, improved learning outcomes, and better management of educational systems.

While Antwi et al. (2018) highlight the growing importance of digital technologies globally, Blackwell et al. (2013) recommend that the use of digital technologies, including the use of electronic media, Internet platforms and enhanced educational technologies, brings multiple benefits such as access to a wider range of learning materials, better explanation, and insight through the use of various presentation tools. Goh and Sigala (2020) suggest that students' use of digital technologies is considered to provide additional support. It provides students with self-practice and tutorials to achieve desired learning outcomes through self-help technical support functions (Ng, 2015). Students' use of digital technologies is characterised by sharing knowledge and strengthening social cohesion (Buabeng-Andoh & Yidana, 2015). This means that, given the current changes in the characterised of education, students can learn collaboratively locally and globally. There are several opportunities to harness the impact of digital opportunities in teaching and learning. However, there are challenges to the use of digital technologies, which are discussed in the next sub-section.

2.2 *Challenges associated with using digital technologies*

Liu et al. (2020) list several sociocultural factors, such as institutional, personal, and technological factors, as barriers to the use of digital technologies. Agyei and Voogt (2011) add that lack of knowledge about integrating digital technologies in the classroom, lack of training opportunities related to technology integration, lack of technology integration in curricula, inadequate time management in schools, and lack of internet in schools may be barriers to the adoption of digital technologies in teaching and learning. Some scholars have pointed out that technical support for the use of ICT in education is crucial (Fearnley & Amora, 2020; Siyam, 2019). Adopting the Technology Acceptance Model (TAM), research by Fearnley and Amora (2020) shows that a lack of technical support and advice is becoming a barrier to the use of digital technologies in education. Abbas (2016) found that a lack of access to computers and technology inhibited classroom technology use, significantly affecting teaching competency and technology adoption. During the COVID-19 pandemic, learning at and from home forced rapid transformations in learning in Ghana, to overcome educational gaps. Luthra and Mackenzie (2020) reported that teaching and learning worldwide became interconnected and digital technologies had a real impact on learning. Tam and El-Azar (2020) also revealed the fundamental changes such as the digital divide which cause changes in educational policies. Educators ensured the continued teaching and learning activities during the pandemic which were facilitated by digital technologies.

2.3 *Relationship between previous studies and the present study*

Studies on the the significance of digital technologies are well-documented. For instance, Spires and Barlett (2012) explain that digital technologies help to find and utilise digital content, produce digital content, and disseminate digital content. Price-Dennis (2016) examined the preparation of students and teachers to integrate digital technologies

into the pedagogy. He reports a gap between the availability and use of digital technologies in teaching and learning. This gap is acknowledged because students use digital technologies in their homes which makes their implementation to foster teaching and learning an easy one (Masterson, 2020). Khatoony and Nezhadmehr (2020) state that digital technologies provided relevant opportunities for language teachers to enhance learners' proficiency. Digital technologies are continuously assimilated into education to aid teaching and learning (Adnan et al., 2019), and this is the best way to create new dimensions and harness potentials (Patil, 2020). A study by Mahmoudzadeh (2014) revealed that using Microsoft PowerPoint improved the vocabulary skills of learners in an English as a Foreign Language context. Bonner and Reinders (2018) credited the encouragement of learners to participate in co-constructing of learning environment with digital technologies. Some of the online platforms used so far include unified communication and collaboration platforms such as Microsoft Teams, Google Classroom, Canvas and Blackboard, which allow the teachers to create courses as well as training and skill development programmes (Petrie, 2020).

The reviewed studies highlighting the significance and impact of digital technologies were conducted before the COVID-19 pandemic. This creates a research space that justifies the present study of the perceived impacts of digital technologies in promoting teaching and learning in Ghana during the COVID-19 pandemic. The findings of the study will be juxtaposed with the previous studies. Notwithstanding, Paschal and Mkulu (2020), Masterson (2020), Lie et al. (2020), Maphosa (2021), and Chiu et al. (2021) are some of the studies that have been conducted during the COVID-19 pandemic. Paschal and Mkulu (2020) adopted a constructivist theory to assess the effectiveness and challenges of online education during the pandemic in Tanzania. Masterson (2020) focused on how digital technologies assist in cross-cultural communication in language instructional processes during the pandemic. She used the ABCs of Cultural Understanding and Communication as the framework. Maphosa (2020) examined the available digital technologies that were used in remote-based teaching and learning. An adapted form of the Technology Acceptance Model was used to guide the study. While Chiu et al.'s (2021) study is mainly a review of special papers that reveal the challenges of learning with digital technologies in some Asian countries during the COVID-19 pandemic, Lie et al. (2020) studied the engagement of language teachers using digital technologies in Indonesia. Lie et al. (2020) used TPACK and SAMR as models to guide their study. It is evident from these studies that no study has been conducted to examine the perceived impact of digital technologies in promoting teaching and learning. Given this gap, the Technology Acceptance Model (hereinafter, TAM) is adopted as a suitable framework to guide the present study.

3. Theoretical framework

According to Davis et al. (1989), the Technology Acceptance Model (TAM) is "an adaptation of Theory of Reasoned Action (TRA) specifically tailored for modelling user acceptance of information systems" (p. 985), which has the potential to predict user behaviour towards technology, technologies use, and their impact (Al-Adwan et al., 2013). TAM's applicability is fully realised in educational contexts (Abbas, 2016). Teeroovengadum et al. (2017) elaborate that perceived usefulness (hereinafter, PU) and perceived ease of use (hereinafter, PEU) are the core components of TAM. As such, PU deals with the degree to which individuals are convinced that digital technologies have an impact on their performance. PEU focuses on how digital technologies are used. While Goh and Wen (2021) measure the attitudes of individuals in TAM by assessing individuals' positive and negative evaluation of digital technologies, Buabeng-Andoh (2018) previously stated that, for individuals to understand the impact of digital technologies in education, they must perceive the resources as easy to use.

TAM has been used in several studies in the educational context (Fearnley & Amora, 2020; Rohatgi et al., 2016; Siyam, 2019; Teo, 2016), confirming its strength and applicability (Afari-Kumah & Achampong, 2010; Farahat, 2012; Fathema et al., 2015). Rohatgi et al. (2016) reveal that TAM provides an appropriate framework to explore the acceptance of technologies in education and determine their impact. Teo (2016) and Siyam (2019) reach a consensus that TAM is simple, easy, and powerful in measuring the impact of technology in education. Adu Gyamfi (2017) reports that perceived ease of use, perceived usefulness, and attitudes influence students' willingness to use digital technology for educational purposes. Similarly, applying TAM to online learning in Egyptian universities, Farahat (2012) found that students' perceptions of ease of use, practicality, and attitudes toward online learning were important determinants of their learning practice. Afari-Kumah and Achampong (2010) conclude that TAM can be directly implemented in

developing countries like Ghana to assess students' intention to use digital technologies and their impact on teaching and learning. A study by Anamoah-Mensah (2011) of 350 students' self-reported intentions to use digital technologies in Ghanaian higher education institutions found that perceived usefulness, perceived ease of use, and attitudes revealed the impact of digital technologies on education.

From the ensuing review of the theory, TAM is applied to the present study in two main ways based on two variables of TAM. Firstly, the perceived usefulness variable of TAM informs analysing Research Question One, where we interpret the effects of digital technologies in promoting teaching and learning. We ascertain the impact of digital technologies through this variable. Secondly, the perceived ease of use variable intertwines with the attitudes of the students toward the use of digital technologies. That is, the attitudes, coupled with external factors such as internet services, lead to the challenges students face in using digital technologies to promote their learning. By this, the easiness that comes with accepting and using digital technologies is informed by the attitudes of the users which serves as criteria for examining the impact of the digital technologies. In all, we use TAM to assess how applicable digital technologies were in promoting teaching and learning during the COVID-19 pandemic in Ghana.

4. Methodology

4.1 *Educational setting*

The present research is set at the University of Cape Coast (UCC), a public educational institution in Ghana. With adequate research facilities, well-known faculty, an ethnically diverse student body, and well-motivated supporting staff, UCC undertakes well-integrated teaching and research activities in five colleges (Education Studies, Distance Education, Humanities and Legal Studies, Agriculture and Natural Sciences, and Health and Allied Sciences). In the last two decades, faculties/schools, and over 100 departments have benefited from regular visits of professors from other universities to offer assistance (Afful et al., 2022).

4.2 *Research design*

The study was based on a qualitative study design. The qualitative design involves discovering detailed information by digging out people's subjective experiences. This allows the researcher to have a solid understanding of the meanings people attribute to their life experiences (Leavy, 2017). In particular, this study relied on phenomenology as a type of qualitative approach in conducting the study. In phenomenology, we are "interested in human consciousness as a way to understand social reality, particularly how one 'thinks' about experience; in other words, *how consciousness is experienced*" (Hesse-Biber & Leavy, 2011, p. 19, emphasis in original). It involves delving into people's experience of the topic under investigation (Leavy, 2017). In the present study, this approach was useful in revealing how our respondents experienced the use of digital technologies in their educational activities during the COVID-19 pandemic.

4.3 *Data collection and analysis*

The study collected data from 10 conveniently sampled students of the University of Cape Coast. All these students used digital technologies during the coronavirus pandemic and could provide useful information to enable us to attain our research objectives. The present research sought to obtain insights from students in order to ascertain their opinions on the use of digital technologies during the coronavirus pandemic. We obtained informed consent from the interviewees as part of the ethical considerations and used semi-structured interviews to collect the data. This enabled us to ask follow-up questions where necessary in order to get deeper insights into the subject under investigation (Brinkmann & Kvale, 2015). Each interview took, in general, about twenty minutes. Qualitative content analysis was employed in analysing the data. This involved carefully reading the transcripts and identifying the emerging themes and sub-themes (Cohen et al., 2018; Ryan & Bernard, 2000). The themes were generated independently by the two authors. We then compared our results and resolved disagreements by coming to a consensus. This ensured the trustworthiness of the findings.

5. Findings

5.1 *Digital technologies used and their effects*

With the digital technologies used, respondents mentioned that they mostly used mobile phone and laptops.

Extract 1

"Okay, I used mobile phone and also the laptop within this period yeah." (Respondent 10)

Extract 2

"I think during the pandemic, the COVID era, I used a lot of technologies. I used the laptop. I had a laptop and a mobile phone, but the one that I used most of the time was my mobile phone. That was what I was using to read PDF files, Word documents, almost everything. So my mobile phone was the main technological device I used during the COVID period." (Respondent 6)

Extract 3

"I used mobile phone, that is, smart phone." (Respondent 7)

Extracts 1-3 show that the students used mobile phones and laptops as digital technology devices during the coronavirus pandemic. As extract 2 shows, the mobile phone was mostly used because of its portability, and it allowed students to read their learning materials wherever they were.

These digital technologies had software that facilitated teaching and learning. Some of these software were mentioned by the respondents:

Extract 4

"Okay I was using the phone and the laptop in terms of Zoom. They mostly used the Zoom method in teaching so I was using the phone and laptop." (Respondent 9)

Extract 5

"I used Google Meet, Zoom, Moodle and then WhatsApp." (Respondent 3)

Extract 6

"I used Zoom, Google Meet, and YouTube. I think these are the only things". (Respondent 2)

Extract 7

"I would say that we mostly used our phones. Mostly because of WhatsApp and the easy access to WhatsApp and the easy communications you can get on that platform." (Respondent 5)

As extracts 4-7 show, students employed a number of software during the coronavirus period. These software include Zoom, Google Meet, Moodle, WhatsApp, and YouTube. These software enabled them to study independently and also have virtual interactions with their course instructors.

According to the students, these technologies were useful in facilitating teaching and learning.

Extract 8

"Oh okay so for the mobile phone, it really helped, especially when the internet connection was very good. I was able to use the mobile phone to go online. And also I think the laptop was very good because of the laptop, you will be able to view documents as well as follow online learning procedures." (Respondent 10)

Extract 9

"Oh they really impacted my learning. It made learning a bit quite easier, in the sense that most of the materials and past questions were uploaded on Moodle so instead of going to print the hard copy, I could just stay in the comfort of my room and get myself a copy of the past questions and read as well as the course materials that we would be used for classes." (Respondent 6)

As shown in extract 8, the use of technologies facilitated learning, especially when the students are on a stable internet connection. Extract 9 also shows that the technologies made learning easier. Students could access their learning materials wherever they were.

The study also found that these technologies had some effects on their learning outcomes. The technologies helped to improve their research skills, typing skills, and information-seeking skills.

Extract 10

"Yes, it has actually improved my research skills, how I'm able to get information for certain kinds of topics." (Respondent 5)

Extract 11

"And also it has improved my typing skills. It has increased the speed and also helped me understand a lot of things better as compared to at first." (Respondent 5)

Extract 12

"Yes, because at first I wasn't close to my laptop. I didn't know how to type and how to use it. But now, I am equipped. I'm good now." (Respondent 3)

Extract 13

"Okay, so I was this type. I only relied on the lecture notes given in class. I wasn't used to finding more information but then in the wake of the COVID and then we being in the house, I was able to do some research and could understand the concept taught in class very well. I realised that most of the topics treated in class will give you the points so you would not have much information in case you are to elaborate it or explain when it comes to examination and all that, you are not able to give much and don't get your preferred mark or something. But then, through the use of these digital technologies, I've been able to learn to find information on my own and not rely on only the slides given to me." (Respondent 8)

Extract 14

"Yes, because I was able to learn faster frequently." (Respondent 7)

Extract 15

"Yes, it really had an impact on my ways of learning, especially the strategies that I use in learning certain texts and topics." (Respondent 8)

Extract 16

"Yes yes yes, there has been a very good improvement because you realise that most of the documents and articles or things that we need to facilitate our learning process are on the internet so the more we get used to the internet, the more we get more documents to help in our studies so it has really helped." (Respondent 10)

As shown by extracts 10 and 13, digital technologies have helped to develop the research and information-seeking abilities of students. Extracts 11 and 12 also show that these technologies have improved the typing skills of students. Also extract 14 shows that the digital technologies enabled the students to learn faster, while in extract 15, we get to know that these technologies have helped students in using the appropriate strategies in learning. Extract 16 reveals that these technologies exposed students to a wide variety of learning materials via the internet, which facilitated learning.

5.2 *Challenges*

The major challenge identified concerns network connectivity. This is what some respondents had to say.

Extract 17

"There was a network problem. In areas where there are poor networks, we realise that there will always be breakages in the networks, so we would not be able to sometimes continue with the educational processes online." (Respondent 10)

Extract 18

"Yes, network challenges. I was having a poor network connection. Sometimes, it's cool. Sometimes too, it's a poor connection." (Respondent 7)

Extract 19

"So the basic challenge I encountered was network connectivity. And the network connectivity problem was actually as a result of where I was, like where I was residing." (Respondent 8)

As extracts 17-19 show, the major challenge that some students identified with digital technologies concerns poor internet connectivity. Sometimes there were breakages in the network, and this militated against the use of these technologies in learning. Relatedly, some locations do not have access to strong internet connections. Thus, students who live in those areas suffer when using digital technologies.

Another challenge concerns the expensiveness of internet bundles, which became a financial burden on students. In relation to this, the students had this to say:

Extract 20

"Okay with regard to challenges, one, there was a financial difficulty, because, in instances where you had no money to buy data, it will be quite difficult because most of the software that we were using to go online used

data." (Respondent 10)

Extract 21

"Financial problems, such as we were buying our own data. But in terms of face-to-face lectures, you don't have to pay anything." (Respondent 9)

Extract 22

''Another challenge is that these digital devices consume quite a lot of data, so in terms of finances I got a bit broke." (Respondent 6)

As Extracts 20-22 reveal, another challenge has to do with the expensiveness of the internet bundle. Since schools closed down during the pandemic and students had to learn from home, they had to rely on their own finances to purchase internet bundles to be able to connect to the internet and have access to the learning materials. This means that a student who does not have money to purchase the internet bundles would not be able to use the digital technologies to learn.

In addition, there was a problem with the manipulation of these devices. Some students mentioned that since these technologies were new to them, they had challenges with operating them in their learning activities.

Extract 23

"And also, you logging in into Zoom was another problem on its own. It wasn't easy since most of us were new to it." (Respondent 9)

Extract 24

"I wasn't used to it at first. It was my first time using the Zoom. And also in terms of technology, I was much addicted to the face-to-face lectures so it was very stressful. It wasn't easy." (Respondent 9)

Extract 25

"One crucial challenge I faced was my machine got damaged." (Respondent 6)

Extracts 23 and 24 show how difficult it was for the students to embrace this new mode of learning. The difficulty mostly concerns how to log in the digital platforms, since most of these students are used to the face-to-face mode of classroom instruction. Also, as extract 25 shows, another challenge has to do with breaking down the digital technologies. Laptops and phones are electronic devices that could break down at any time. In cases, where students do not have spare laptops or computers, they could not continue with their studies when their laptops get damaged.

5.3 *Coping strategies*

In the face of the challenges reported above, students adopted a number of strategies to overcome them. These strategies include relocating to places with a stable internet connection, soliciting financial assistance from parents, switching to MiFi, and seeking friends' assistance.

Concerning relocating to a place with a stable internet connection, some students had this to say:

Extract 26

"With the network problem, you would have to move from your area where there is poor network connectivity and go to a better place in which you can have a smooth network." (Respondent 10)

Extract 27

"So I had to move to a different place where I can have access to the internet. (Respondent 8)

In my home, the network was bad so I had to travel to the next town to get a stable network for my studies." (Respondent 3)

One student who sought financial assistance from parents to be able to buy internet bundles had this to say:

Extract 28

"It all boils down to finances. I had to ask for financial help a bit from my parents because they are the ones looking after me so to help me with money in purchasing data bundle for these Zoom meetings, Zoom classes and other online academic-related stuff." (Respondent 6)

One student noted that he switched to MiFi because there was pressure on the main network, and this solved the internet connection problem.

Extract 29

"Along the line, I was able to purchase a MiFi which I actually used in order to improve it. And it actually helped." (Respondent 5)

Also, a student who had difficulties logging in the digital platforms reported that he sought assistance from colleagues, who assisted him to navigate his ways through the digital platforms:

Extract 30

"And also, since I wasn't used to it and it was my first time using it, I consult most of my friends who were used to these technologies to assist me in logging in the Zoom and all." (Respondent 9)

6. Discussion

First, it was revealed that students used digital technologies such as phones and laptops to facilitate learning during the coronavirus period. This finding agrees with the findings of some previous studies on the use of digital technologies in educational institutions. Papadakis and Kalogiannakis (2017), for instance, reported that mobile phones have provided innovative means to rejuvenate teaching and learning. Similarly, a study in Ghana, South Africa and Malawi showed that the use of mobile phones for educational purposes has proved useful, especially in helping students to discover their potential (Porter et al., 2016). Also, Mailizar et al. (2020) have found that in Indonesia, digital technologies were impactful when educational institutions were closed down during the outbreak of COVID-19.

Another significant discovery the present study made is that such digital technologies have software installed on them, which facilitates learning. These software include Moodle, Zoom, WhatApp, Google Meet, and YouTube. A similar finding was reported by Petrie (2020), who mentioned Microsoft Teams, Google Classroom, Canvas and Blackboard as some of the software used for educational purposes during the coronavirus pandemic. According to Petrie, these software enabled instructors to create educational courses, as well as training and skill development programmes. In Europe, Crawford et al. (2020) report that educational institutions used asynchronous and synchronous digital technologies to promote teaching and learning.

It was also found that these digital technologies made learning easier for students. In particular, students could access their reading materials wherever they were. The finding is in tandem with the findings of previous studies that have revealed that digital technologies expose students to unlimited information and facilitate independent learning (Papadakis, 2018; Zakaria & Khalid, 2016). Correspondingly, Goh and Sigala (2020) have noted that digital technologies have extended educational instruction beyond the confines of the classroom. Goh and Sigala add that digital technologies encourage self-practice and self-technical support through tutorials that enhance learning. In addition, Blackwell et al. (2013) highlight that digital technologies come with a number of benefits, including access to a wider range of learning materials, better explanation, and insight through the use of various presentation tools.

The study also found that these technologies had some effects on their learning outcomes. The technologies helped to improve their research skills, typing skills, and information-seeking skills. This resonates with the findings of Papadakis (2016) that digital technologies help students to acquire digital skills.

The study also revealed that students encountered some challenges in using these digital technologies, and they had to use various strategies to overcome these challenges. For instance, since the use of these technologies was new to students, they found it difficult to use some of the software. This echoes the observation of Bansah and Agyei (2022) that it is difficult to integrate digital technologies into teaching and learning. Similarly, Liu et al. (2020) have noted that the effective use of digital technologies to promote learning may be obstructed by socio-cultural, institutional, personal, and technological barriers. Particularly, as noted by Agyei and Voogt (2010), some of these barriers are lack of knowledge about integrating digital technologies in the classroom, lack of training opportunities related to technology integration, lack of technology integration in curricula, inadequate time management in schools, and lack of internet facilities in schools.

7. Conclusion

The present study sought to investigate the use of digital technologies among students of the University of Cape Coast during the coronavirus pandemic. Relying on TAM, the study adopted the qualitative methods of research, involving semi-structured interviews with 10 students from the selected university. The study reports that students

mainly used mobile phones and laptops to facilitate learning. Essentially, these devices contained some crucial software such as Moodle, Zoom, Google Meet, WhatsApp, and YouTube which were used by students for their educational activities during the pandemic. Again, it was found that the use of these technologies came with some challenges, notably unstable network connectivity, expensive data bundles, damaging of technological devices, and unfamiliarity with the operation of some software. In view of these challenges, students relied on funding from parents, moved to places with the stable network, and relied on the assistance of friends.

One implication of the study is the need to scaffold students' digital literacy to enable them to effectively use the digital technologies, as these technologies have become part of the educational structure of Ghana. This can be done by offering training to students on the use of educational software installed on phones and laptops. When this is done, the issue with the unfamiliarity with software will be eliminated. In line with this, the extant literature has noted the need for technical support in the use of digital technologies in schools (Fearnley & Amora, 2020; Siyam, 2019). Fearnley and Amora (2020) have also noted that a lack of technical support and advice is becoming a barrier to the use of digital technologies in education.

Relatedly, it is important for educational institutions to liaise with network providers to provide students with devices such as MiFi that can ensure stability in internet connection. Students complained that the network problem normally resulted from the fact that many people use the network at a time. Therefore, when students are provided with MiFi, it will ensure that students have stable internet. This will go a long way to enhance their use of technology in learning.

Conflict of interest

The authors declare no conflict of interest.

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