



## CHALLENGES OF ONLINE INSTRUCTION AND INFORMATION TECHNOLOGY INTEGRATION IN COVID-19 PANDEMIC: PERSPECTIVES OF ACADEMIC STAFF IN GHANAIAN UNIVERSITIES

Paul Nyagorme , Valentina Arkorful and Simon-Peter Kafui Aheto

*Information and Communication Technology (ICT) integration is essential, especially after the COVID-19 pandemic. While the need for ICT integration in today's pedagogical activities is inevitable, online instruction in Ghanaian higher education is still challenging. Referring to the pressing need for ICT integration and online instructions amid COVID-19, we assess the challenges academic staff in Ghanaian universities encounter concerning online instructions and ICT integration into pedagogical activities. We conducted a cross-sectional survey with 628 (response rate of 83.1%, N=522) academic staff from two universities. Results reveal that instructors/lecturers' challenges (inadequate ICT infrastructure and lack of stable electric power) and institutional challenges (lack of consistent practice and limited technical assistance) predominantly affects online instructions and ICT integration. The implication drawn from our findings is that the challenges of online instruction and ICT integration in Ghanaian universities are interrelated. We recommend that stakeholders and policy-makers in Ghanaian universities should endeavour to provide holistic solutions rather than solving the identified challenges in isolation.*

**KEYWORDS:** Covid19, Challenges, Online Instruction, ICT Integration, University Academic Staff

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## INTRODUCTION

Regardless of nationality, race, technological advancement, level of education, or economic prowess, the COVID-19 pandemic engulfed all spheres of human life. The extent of coverage of the effect of the pandemic on human life led to an attack on educational systems leading to the suspension of school activities most especially, teaching and learning. As result, managers of tertiary institutions globally were encouraged to provide alternative learning opportunities to ensure continuity of instruction. These alternative learning opportunities included online teaching and learning. This, however, urged tertiary institutions to shift their tuition from face-to-face to online instruction, and more recently through blended instruction (Shahrill et al., 2021). Online instruction in this pandemic has become quintessential since it is an effective avenue to maintain learning continuity. Adarkwah (2021) acknowledged that online education produces an environment involving several educational prospects over traditional teaching, learning and training. With online education, many informational resources can be seamlessly integrated into teaching and learning. This calls for the need for instructors and course designers to encourage more online formats of teaching and learning amid the pandemic. Not only do students find online education to be both accessible and convenient, but also a critical long-term strategy for institutions (Dhawan, 2020).

Although this recent shift in normal educational activities persists, ICT remains an indispensable factor in up-to-date education and its use in this present teaching-learning process has shown much involvement. In online instruction, lecturers teach via a platform where students can access and also share study materials via varied media like microblogs, Learning Management Systems, WhatsApp, or other electronic means (Habibi et al., 2020). According to Felix (2020), instructors have resorted to popular applications including Google Meet, learning management systems, Voov, Zoom, Superstar, and G-suite cloud meetings to engage students in online instruction to make room for lost hours.

Undoubtedly, the use of online instruction by academic staff of tertiary institutions has become significant, especially in this era. Given this, Soni (2020) emphasises that online instruction has become relevant such that students learn through diverse discussions. Ma et al. (2021) caution lecturers that in engaging students in online teaching, challenges such as insufficient pre-class preparations, and inadequate and unsatisfactory participation in class discussions, serve as threats to effective online instruction. Johnson and colleagues add that lectures should be aware of the fact that the difficulty levels, length, and quality of teaching materials should correlate with students' learning and academic readiness. This should be coupled with timely feedback by the lecturers to motivate their students.

Previous studies have confirmed several factors that affect online instruction and ICT integration amid the COVID-19 pandemic. Prominent among these factors are the high cost of purchasing ICT devices, management's attitudes and poor power supply affect ICT integration and online instruction (Aheto & Cronje, 2018; Aljaraideh & Bataineh, 2019; Turugare & Rudhumbu, 2020). Other challenges such as inadequate technical support, the uneven spread of access to ICT facilities, poor network services, and lack of continuous professional development of university academic staff affect effective ICT integration and online instruction (Lembani et al., 2019; Turugare & Rudhumbu, 2020). Other factors that remain key in the analysis of the challenges of online instruction and ICT integration into instruction are the lack of effective training on ICT integration, and the lack of competence and commitment of instructors (Jaradat & Ajlouni, 2021; Maphalala & Adigun, 2020; Mohammadi et al., 2021). These challenges to ICT integration continue to dominate discussions at all levels of the educational enterprise.

While previous studies look promising in exploring the challenges of online instruction and ICT integration during this time of the COVID-19 pandemic, the challenges of online instruction and ICT integration especially in the Ghanaian tertiary institutions have not been fully studied. Studies conducted so far have focused on the international fronts (Ali, 2020; Aljaraideh & Bataineh, 2019; Bean et al., 2019; Ferri et al., 2020; Jaradat & Ajlouni, 2021; Lembani et al., 2019; Turugare & Rudhumbu, 2020). The few studies that have been conducted in Ghana did not focus on the key challenges that affect online instruction and ICT integration into instruction in tertiary institutions (Adarkwah, 2021; Arthur-Nyarko & Kariuki, 2019). A related study conducted by Agormedah et al. (2020) only explored students' responses and the challenges students face in online learning neglecting to explore the challenges that are encountered by other key players in universities such as academic staff.

The present study is needed in the Ghanaian tertiary institutions because users such as members of the National Union of Ghana Students (NUGS) have described online instruction as "challenge-ridden" (Adarkwah, 2021). However, the key challenges that affect online instructions and ICT integration, especially in Ghanaian universities remain holistically uncovered. There is the need to use empirical evidence to confirm the challenges of online instruction and ICT integration in Ghanaian universities like the way it has been reported in other contexts and jurisdictions during this pandemic. This is necessary because, the presence of COVID-19 demands that educational instructions especially at the tertiary inculcate components of online instructions, and university academics should be able to integrate ICT into their instructions. The prevalence of any challenge will hinder the achievement of this goal. In this study, we provide evidence of the challenges university academics face in

online instruction and ICT integration into their teaching and learning sessions during the pandemic. The specific objectives were to explore the challenges experienced by academics of tertiary institutions in Ghana in online instruction and concerning ICT integration in instruction amid the COVID-19 pandemic. Dependent on the specific objectives, the key research questions are developed:

1. What are the challenges academic staff of tertiary institutions in Ghana face in online instruction amid the COVID-19 pandemic?
2. What ICT integration challenges do the academic staff of Ghanaian tertiary institutions face in online instruction during the COVID-19 pandemic?

## REVIEW OF LITERATURE

The study is guided by the Technology Acceptance Model (TAM). Pioneered by [Davis \(1989\)](#), the theory explains how individuals or users of information systems accept new technology. The theory is made up of two important components: the individual's intentions to use technology, and how that individual perceives the technology to be useful and easy to use. [Clarke and Braun \(2013\)](#) argue that these components of TAM are critical determinants of people's intention to use technology. Amid the COVID-19 pandemic where there has been a paradigm shift in pedagogical activities from the traditional face-to-face to online or blended learning, university academics are tasked to result in new technology in online teaching. These technologies include Zoom, Google Meet, learning management systems, and Skype, amongst others.

Perhaps these technologies in pedagogical approaches can be new to most university academics in a developing country like Ghana. Their intentions to use such tools effectively will be determined by how easy to use, and how useful these tools are in their instructional activities. Based on TAM, we argue that any challenges that are faced by university academics in integrating such tools in their online instructional will affect the ease to use and usefulness of the tools, which will also affect their intentions to use them in their pedagogical approaches. For instance, when university academics are not trained well to use such tools, they may not have the competencies to use them, which will affect their ease and intentions to embrace such tools. Similarly, inadequate technical support, the uneven spread of access to ICT facilities, and poor network services may also affect university academics' intentions to use such tools. Arguably, university academics who may perceive the tools as difficult to be used in their pedagogical practices as a result of existing challenges may not adopt such tools or technology. This is affecting the kind of educational continuity that is needed in this present era of pedagogical transition.

## ICT in Instruction

Today, Information Communication Technology is inevitable in global and literacy development. Instructors are required to play key roles regarding ICT use in teaching and learning experiences. Paramount of such roles is the integration of ICT in instruction. Integrating ICT in our educational setting involves a multipartite approach that relates to the teacher's experiences and characteristics, curriculum, personnel traits, learning environment, school leadership and a robust framework (Judge, 2013). ICT Integrating connotes an analysis of teaching and learning as a process of identifying gaps in teaching and learning and proffering suitable solutions. In the integration of ICT in instruction, the focus is on the product and process that can best fit the teaching and learning situation or problem.

To guarantee a thriving ICT integration within a teaching and learning space, it is instructive to assess the issues such as physical environment, support and maintenance, and other resources needed for successful deployment coupled with the mission, vision and culture of the school (Tondeur et al., 2009). Furthermore, at the implementation stage, Sarkar (2012) also noted that the critical issues worth looking at are many but not limited to management and leadership issues, funding, and sustainability. ICT integration in online instruction ensures growth and efficiency in all educational sectors especially during this pandemic, however, instructors' integration of ICTs depends on whether they are trained to integrate ICT (Mohammadi et al., 2021). This means that ICT integration in instruction is successful when instructors and students have the will, skills, and access to ICT tools.

Accessibility to ICT resources is directly interlinked with its usage. The provision of infrastructure in tertiary institutions alone does not translate into use but is dependent on how their management monitor contributions ICT integration and incentivise its use (Aheto, 2017). To integrate ICT into instruction, four stages are important. These are emerging, applying, infusing, and transforming (Ifinedo & Kankaanranta, 2021). The Emerging stage focuses on the identification of ICT components and acquisition of rudimentary ICT skills for instruction. Applying stage is the stage that considers adaption of the curriculum to maximise the use of ICT potentials in diverse disciplines using suitable tools in teaching (Wu & Wang, 2021). Infusing stage accounts for ICT resourcing to make it easy for integration both at teaching and professional levels for teachers and learning levels for students. At this stage, the sustainability of Internet connectivity and availability of other improve instruction is vital. Transforming is where ICT is fully integrated and used in online instruction (Anderson, 2010). Arguably, integrating ICT will help to rethink and renew educational institutions in creative ways, and serve as the continuity of instruction, especially in this current pandemic.

## Challenges of Online Instruction

Particularly, the significance of ICT in education in tertiary institutions cannot be understated due to its value for instructors and students. Previous studies have reported challenges such as access to ICT resources, inadequate ICT knowledge of instructors, insufficient communication facilities, lack of electric power, high cost of online instruction, and rejection of online instructors by instructors (Aljaraideh & Bataineh, 2019; Chau, 2019; Jaradat & Ajlouni, 2021; Mohammadi et al., 2021; Oyedotun, 2020; Tokareva et al., 2019). A study conducted by Arthur-Nyarko and Kariuki (2019) in Ghana reported that access to ICT resources was a problem and posed a challenge to online instruction. This is against the background that online instruction is pivoted on the availability of Internet communication. It becomes feasible through the use of internet communication facilities which are classified as ICT resources or tools. Lem-bani et al. (2019) confirmed that uneven spread of access to internet facilities among different instructors coupled with poor network services serve as a threat to effective online instruction. For Chau (2019), the lack of internet access and the insufficient number of internet communication facilities serve as challenges to instructors. This confirms the assertion that instructors in tertiary institutions are faced with networks problems and internet access which hinder effective online instruction.

In the findings of Tarhini et al. (2019), one major challenge militating against the use of online instruction among academic staff in tertiary institutions is the lack of adequate knowledge of instructors in ICT. Lack of technology skills and inadequate background experience of lecturers/instructors are the key major challenges of online instruction (Adarkwah, 2021). It is in this regard that Bean et al. (2019) recommended that university teachers ought to have the required advanced technological skills for effective online instruction. Again, Habibi et al. (2020) reported a lack of experience in organising online instructions. Mtebe and Raisamo (cited in Adarkwah (2021)) pointed out that in Tanzania, it was found that about 63% of lecturers involved in online instruction were short of the required skills for creating and developing e-resources for education.

On other challenges, Arthur-Nyarko and Kariuki (2019) reported limited access to electricity as another key element affecting online instruction. This is coupled with the high cost of online instruction. Particularly, online instruction has been expensive due to the high cost of internet communication facilities, high cost of internet connectivity, and high cost of purchasing technology (Sinha & Bagarukayo, 2019). This has resulted in the lack of internet access and internet communication tools which has affected the progress of online instruction (Depaul, 2020). According to Bean et al. (2019), one of the challenges of online instruction is limited funding, which makes online instruction to be more expensive than face-to-face courses. Other challenges such as rejec-

tion of online teaching by lecturers, and the time-consuming nature of online instruction have also been reported (Adarkwah, 2021; Ali, 2020).

Studies to explore the major challenges of online instruction, especially from the Ghanaian context remain scanty. Studies so far in Ghana have focused on the challenges of ICT in educational development to the neglect of the challenges of online instructions, especially on the tertiary educational front. Other studies such as Adarkwah (2021) focused on barriers to online instruction amid COVID-19 but failed to focus on tertiary institutions. The study by Ofori (2019) which assessed ICT application in teaching and learning did not consider the challenges of online instructions. Referring to the current pandemic that has emphasised the use of online instruction, the question of what key challenges militate against online instruction, especially in Ghanaian tertiary education has not been fully answered empirically. To extend the empirical discussion on the tertiary education front concerning the challenges of online instruction, the current study is relevant.

### Challenges of ICT Integration in Instruction

The integration of ICT in Ghanaian tertiary institutions has faced some challenges. Many of these challenges are compounded by the fact that many of our tertiary institutions have incorporated ICT in their schools without the necessary blueprint, policies, and programmes. Empirical studies have indicated that a good number of academic staff may be versed in computer manipulation and use, especially for virtual instructions but underutilise these technologies for teaching and learning.

A study conducted by Habibi et al. (2020) makes clear findings that point to the fact that most of the challenges reported by lecturers are challenges caused by the lack of time to design technology-related lessons, embark on Internet research or explore adequate resources such as educational software useful for the lessons. Rana and Rana (2020) found that lecturers' issue with time is multifaceted which further affects their rate in the timely completion of tasks. Furthermore, the lack of competency in the use of ICT and integration lecturers' is a challenge faced by a section of lecturers. The practice and skill of ICT integration into the curriculum and online instruction is a challenge for several lecturers thereby lowering the confidence in integrating ICT for teaching and learning (Tarhini et al., 2019). Consequently, the lack of lecturers' competence in ICT integration and related issues presents barriers to integrating ICT in instruction. The most frequently reported challenge is the lack of effective training and lecturers who do not lack the competence in ICT but fail to integrate technologies into the promotion of teaching (Mohammadi et al., 2021). Other challenges have to do with inadequate or lack of ICT resources,

lower levels of quality standards of ICT integration coupled with emerging realities faced within the higher education space.

Studies have shown that challenges militating against ICT integration emerge from the various schools. One of such challenges is a school with limited technical support. [Sicilia \(2005\)](#) in her study, corroborated by [Turugare and Rudhumbu \(2020\)](#) revealed that the lack of technical assistance among the schools is a widespread and topmost barrier to ICT use in education. Further on the consequences of the lack of technical support, recent studies by [Owusu-Fordjour et al. \(2020\)](#) support earlier findings by Sicilia, Turugare and Rudhumbu on the lack of technical support. The latter also found that lack of technical support coupled with privacy, high cost of devices and ineffectiveness in handling multimedia tools posed serious challenges ([Owusu-Fordjour et al., 2020](#)). Management attitude is also identified as one of the challenges of ICT integration. Management support for the integration and acquisition of ICT infrastructure (including the Internet) for some institutions continues to raise concerns ([Asamoah, 2021](#)).

Regarding internet connectivity, [Ofori \(2019\)](#) found that there is low internet connectivity in Ghana, and this has been extended to tertiary institutions. Another challenge that emanates from the school has to do with the power supply. Power supply in Ghana appears erratic and this is affecting ICT integration in lecturers' online instruction ([Ofori, 2019](#)). Generally, most ICT tools needed for teaching and learning depend on a constant supply of electricity. In some instances, erratic power supply has also caused functional ICT devices to be destroyed, which affects the integration of ICT in instruction and online instruction. [Turugare and Rudhumbu \(2020\)](#) reported in Lesotho that ICT integration is faced with challenges such as "inadequate technical support, availability of fair supply of infrastructure and continuous professional development are factors that encourage effective ICT integration."

The review so far on the challenges of ICT integration depicts that much has not been done from the Ghanaian context especially in tertiary institutions, especially in this era of COVID-19. Academic staff in universities should be able to integrate ICT into their instruction, especially in this era of COVID-19 where online instruction is required. There is a need for further research work, focusing on tertiary educational institutions to confirm the challenges that have been reported as facing ICT integration in educational institutions. This will help stakeholders in tertiary education to provide the needed intervention to curb such challenges to better equip the academic staff of tertiary institutions in Ghana to integrate ICT in instruction and online instruction.



## SAMPLE FOR THE STUDY

The study was a cross-sectional survey where 628 (response rate of 83.1%,  $n=522$ ) academic staff from the University of Cape Coast, Cape Coast ( $n = 298$ , 57.1%) and University of Education, Winneba ( $n = 224$ , 42.9%) were conveniently sampled. The two universities were used because, as compared to the other universities in Ghana, they are most accessible to the researchers to gather data. The inclusion criteria were academic staff (teaching) who could use ICT and have received training for online instruction, especially within the period of the COVID-19 pandemic. Majority of the respondents were males ( $n = 398$ , 76.2%) while 124 (23.8%) were females. Thus, the surveyed respondents were male-dominated. About 23 (4.4%) were professors, 201 (38.5%) were senior lectures, 200 (38.3%) were lectures and 98 (18.8%) were assistant lectures, indicating that majority of the surveyed respondents were senior lecturers.

## INSTRUMENT AND VALIDATION

A questionnaire was developed by the researchers to collect data for the study. The questionnaire was developed based on conceptual and empirical literature in line with the aim of the study and was validated by the researchers before data collection. The questionnaire had 28 items (apart from the demographic variables of respondents) measured on a 4-point Likert scale: 1 = strongly disagree, 2 = disagree, 3 = agree and 4 = strongly agree. There were three sections, namely the demographic section, challenges of online instruction [COI] (with 13 items), and challenges of ICT integration in instruction [CITI] (15 items). The last section of the questionnaire which focused on ICT integration in instruction was multi-dimensional: lecturers' challenges (8 items) and school challenges (7 items). Samples of the items include: "there is a lack of power stability during online instructions in my institution", "internet connectivity is constantly poor in online interactions in my institution", "there is inadequate time for online instructions and ICT integration due to the nature of my work" and "lecturers generally lack the required skills to effectively integrate ICT into online instructions".

A pilot study of the instruments was done on ten per cent (10%) of the academic staff at the Institute of Distance Education, University of Ghana, Legon. This university was chosen because the staff were deemed to be familiar with the topic and could respond appropriately to the items in the questionnaire. The items were further subjected to a factor analysis where Eigenvalues and screen plots confirmed all the items in all the sections of the questionnaire, apart from the section that focused on demographic variables. For reliability (as measured by Cronbach's alpha) of the various sections: challenges of online instruction stood at 0.81 and challenges of ICT integration in online instruction

were 0.84 which indicates strong reliability. For validity issues, the absolute model fit, incremental model fit, and parsimonious model fit were fulfilled as the Root Mean Squared Error Approximation (RMSEA) for all the dimensions of the questionnaire were less than 0.80 (COI = 0.64, CICTI = 0.73), Comparative Fit Indexes (CFI) were close to 0.95 (COI = 0.93, CICTI = 0.96) whereas for Parsimonious Model Fits (CMIN) was less than 5.0. (COI = 4.2, CICTI = 3.9). For a good construct, the RMSEA should be less than 0.08, CFI should be more than 0.95 and CMIN should be less than 5 ([Orcan, 2018](#)).

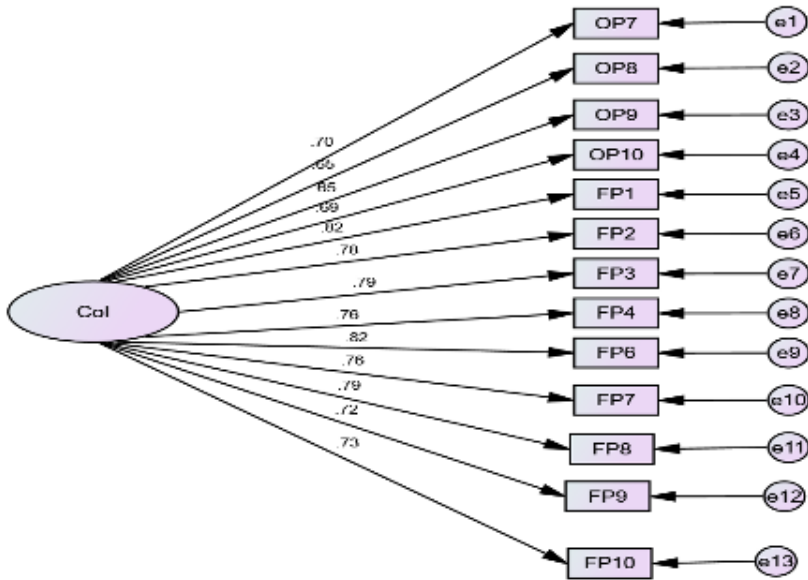
## DATA COLLECTION

Data collection covered a five-month period (from August to December 2020) where field assistants were trained based on the purpose of the study to take data. In the field, the purpose of the study was explained thoroughly among the surveyed respondents. During the period, all ethical issues such as informed consent, voluntary participation, right to privacy, anonymity, and confidentiality were strictly adhered to. The questionnaires were administered to the respondents and the instructions about answering the questionnaire were explained to them. Enough time was given to respondents to respond to the questionnaire items after which they were returned on agreed dates.

## RESULTS OF THE STUDY

A Confirmatory Factor Analysis (CFA) through 5,000 bootstrap samples was conducted using Analysis of Moment Structures (AMOS). This analysis was not particularly aimed at validating the questionnaire. However, we aimed at determining the number of variances in each of the factors that contributed to the challenges of online instruction and ICT integration among the academic staff. Details of the results are presented based on the specific objectives of the study.

The first objective sought to explore the challenges faced by academic staff of tertiary institutions in Ghana in online instruction. The research question that guided this objective is: What are the challenges academic staff of tertiary institutions in Ghana faces in online instruction amid the COVID-19 pandemic. The CFA was performed and Figure 1 and Table 1 present the details of the analysis.



**Figure 1. Measurement Model for Challenges of Online Instruction Faced by Academic Staff; Key: COI= Challenges of Online Instruction.**

**Table 1**

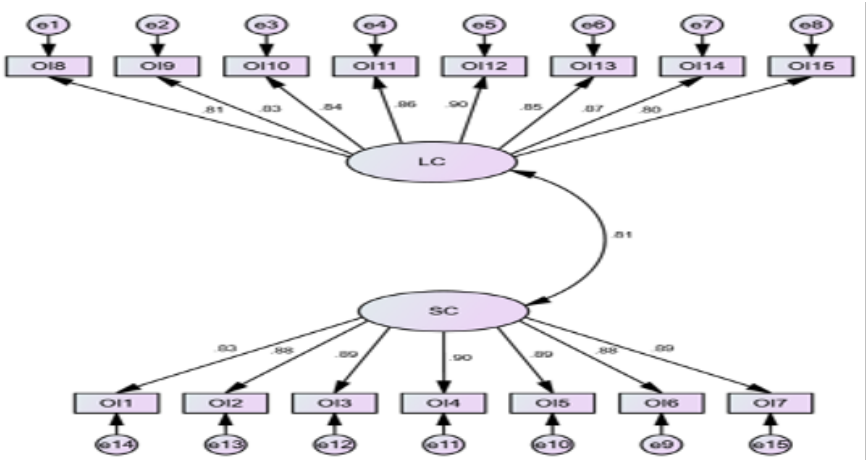
**Challenges Faced by Academic Staff in Online Instruction.**

| No.  | Items                                      | <i>B</i> | S.E. | <i>p</i> |
|------|--|----------|------|----------|
| OP7  | Instructors' commitment                    | 0.70     | 0.09 | 0.00     |
| OP8  | Students' readiness for online instruction | 0.66     | 0.09 | 0.00     |
| OP9  | Lack of commitment of authorities          | 0.65     | 0.09 | 0.00     |
| OP10 | Limited funding                            | 0.69     | 0.09 | 0.00     |
| FP1  | Inadequate ICT infrastructure              | 0.82     | 0.09 | 0.00     |
| FP2  | Internet challenges                        | 0.78     | 0.08 | 0.00     |
| FP3  | High cost of online instruction            | 0.79     | 0.08 | 0.00     |
| FP4  | Inadequate computer experience             | 0.76     | 0.08 | 0.00     |
| FP6  | Lack of stable electric power              | 0.82     | 0.08 | 0.00     |
| FP7  | Insufficient time                          | 0.76     | 0.08 | 0.00     |
| FP8  | Inadequate ICT knowledge by instructors    | 0.79     | 0.08 | 0.00     |
| FP9  | Insufficient communication facilities      | 0.72     | 0.08 | 0.00     |
| FP10 | Low acceptance of online instruction       | 0.73     | 0.08 | 0.00     |

$\beta$  = Factor loading, S.E. = Standard Error

Results in Figure 1 and Table 1 indicate that a lot of factors significantly hinder online instruction in tertiary institutions in Ghana. Table 1 illustrates that the factor loadings of all the items that relate to the challenges of online instruction range from 0.65 to 0.82 with  $P < 0.001$ . Other challenges include internet challenges, high cost of online instructions, inadequate computer experience, lack of stable electric power, insufficient time, inadequate ICT knowledge by instructors, and insufficient communication facilities. From the results, inadequate ICT infrastructure ( $\beta = 0.82$ ,  $p < 0.001$ ) and lack of stable electric power ( $\beta = 0.82$ ,  $p < 0.001$ ) served as the greatest challenges of online instruction.

The second objective sought to explore the challenges faced by academic staff of tertiary institutions in Ghana concerning ICT integration in instruction. The research question that guided this objective is: What ICT integration challenges do the academic staff of Ghanaian tertiary institutions face in online instruction during the COVID-19 pandemic? The CFA through AMOS was performed and Figure 2 and Table 2 present the details of the analysis.



**Figure 2. MeasurementModel For Challenges Of ICT Integration Faced By Academic Staff; Key: LC = Lecturers-Related Challenges; SC = School-Related Challenges.**

From Figure 2 and Table 2, factors from lecturers and schools/institutions serve as challenges to ICT integration in instruction. Table 2 presents that for lecturers' factors, the factor loadings of all the items that relate to the challenges of ICT integration range from 0.80 to 0.90,  $P < 0.001$ . For schools/institution factors, factor loadings range from 0.83 to 0.90,  $p < 0.001$ . This confirms that from the perspective of the academic staff that were surveyed, the challenges of ICT integration result from both lecturers/instructors and the institutions/

**Table 2****Challenges Faced by Academic Staff in ICT integration into Instruction**

| No.                                    | Items  | <i>B</i> | S.E. | <i>p</i> |
|--|--|----------|------|----------|
| <b>Lecturers' Challenges</b>           |  |          |      |          |
| OI9                                    | Difficulty to plan technology instructions                       | 0.83     | 0.10 | 0.00     |
| OI10                                   | Difficulty in exploring internet sites                           | 0.84     | 0.09 | 0.00     |
| OI11                                   | Difficulty in using instructional software                       | 0.86     | 0.09 | 0.00     |
| OI12                                   | Lack of consistent practice                                      | 0.90     | 0.09 | 0.00     |
| OI13                                   | Inadequate training  | 0.85     | 0.10 | 0.00     |
| OI14                                   | Inadequate resources   | 0.87     | 0.09 | 0.00     |
| OI15                                   | Inadequate time  | 0.80     | 0.10 | 0.00     |
| OI18                                   | Lack of confidence and competency                                | 0.81     | 0.10 | 0.00     |
| <b>School/Institutional challenges</b> |  |          |      |          |
| OI1                                    | Inadequate supply of infrastructure                              | 0.83     | 0.10 | 0.00     |
| O12                                    | Inadequate continuous training                                   | 0.88     | 0.10 | 0.00     |
| OI3                                    | Lack of consistent power supply                                  | 0.89     | 0.10 | 0.00     |
| OI4                                    | Limited technical support  | 0.90     | 0.10 | 0.00     |
| OI5                                    | The commitment of the institution to support online instructions | 0.89     | 0.11 | 0.00     |
| OI6                                    | Safety and privacy issues  | 0.88     | 0.10 | 0.00     |
| O17                                    | Higher cost ICT devises  | 0.89     | 0.10 | 0.00     |

$\beta$  = Factor loading, S.E. = standard error

schools within which they work. The challenges that resulted from the instructors/ lecturers are lack of confidence and competency, difficulty to plan technology instruction, difficulty in using instructional software, lack of consistent practice, inadequate training, inadequate resources, and insufficient instructional time. The school/ institutional challenges are safety and privacy issues, inadequate supply of infrastructure, inadequate continuous training, lack of consistent power supply, limited technical support, and schools' commitment to supporting online instruction and higher cost ICT devices. From the results lack of consistent practice ( $\beta = 0.90$ ,  $p < 0.001$ ) and limited technical assistance ( $\beta = 0.90$ ,  $p < 0.001$ ) were the highest reported lecturers and school/ institutional challenges respectively.

## DISCUSSION

The study found that numerous factors serve as challenges to online instruction. These are low acceptance of online instruction, instructors' commitment, students' readiness, lack of commitment of authorities, limited funding, and inadequate ICT infrastructure. Others include internet challenges, high cost of online instructions, inadequate computer experience, lack of stable electric power, insufficient time, inadequate ICT knowledge by instructors, and insufficient communication facilities. The results depict that the factors are interrelated as one leads to the other. For instance, when instructors/lecturers exhibit low acceptance of online instruction, it affects the level of their commitment which can have a cumulative effect on students' readiness. Again, when institutions lack funding, it will affect the procurement of ICT tools such as the internet, organisation of training for instructors, and buying of applications of online instructional as such Zoom and Skype, amongst others. The prevalence of such challenges as reported by the academic staff tends to affect the way they practice online instruction during this pandemic.

In line with TAM, university academics' intentions to accept technology are based on how easy the technology can be used and its perceived usefulness (Davis, 1989). When academic staff is faced with the challenges such as the aforementioned, it will create difficulties in their usage. For instance, challenges in limited internet access will demotivate academics staff in engaging in online instruction which will affect their intention to use pedagogical technologies such as Zoom application, and learning management systems, amongst others (Arthur-Nyarko & Kariuki, 2019). Inconsistent with Lembani et al. (2019), the uneven spread of access to technological facilities among different instructors, and poor network services serve as a threat to effective online instruction. Academic staff complained of unstable Internet service which is an important resource for online instruction. This provides ample evidence that internet services in Ghanaian institutions remain a threat to online instructions.

Other factors that serve as the challenges include lack of adequate knowledge of instructors in ICT, lack of technology, lack of experience, access to electricity, and cost of purchasing communication technology which confirms previous studies (Arthur-Nyarko & Kariuki, 2019; Jaradat & Ajlouni, 2021; Mohammadi et al., 2021; Sinha & Bagarukayo, 2019). The challenges that have been reported by the academic staff suggest that amid the COVID-19 pandemic, university education in Ghana is an online technological problem. This stands the chance of affecting online instruction and educational continuity, especially in this era of COVID-19 which demands the use of ICT tools such as Zoom, Skype, and instructional management systems.

On challenges of ICT integration in instruction, we confirmed school/institutional and lecturers/instructors' challenges such as lack of confidence and competency, difficulty to plan technology instruction, and difficulty in using instructional software. Others include lack of consistent practice, inadequate training, inadequate resources, and insufficient instructional time. These variables are critical in ICT integration, especially in tertiary institutions. When instructors do not have the needed time or find it difficult to access and use instructional software to plan instruction that demands the use of ICT, they will be reluctant to employ them in their teaching and learning (Davis, 1989). The situation becomes worse when such instructors/lecturers do not constantly practice the use of ICT tools in instruction or lack adequate training. This will affect their level of confidence and competence. Among the academic staff, there were surveyed, they have reported the integration of ICT at their level is faced with personal challenges such as the aforementioned. In line with previous studies such as Habibi et al. (2020), the university academics lack the needed time to plan technological lessons, explore different internet sites, or look at various aspects of educational software to support instruction.

The surveyed university academics also reported that they lacked effective and constant training that regard how to integrate ICT into their instruction. It is therefore not surprising that the academic staff in the sampled institutions confirmed that they lacked confidence and competence in integrating ICT into pedagogical practice and online instruction (Tarhini et al., 2019). Amid the COVID-19 pandemic which demands online and/or blended instructions unlike traditional face-to-face instructions, some university academics are to be trained to use online instructional tools. The lack of effective training will affect their competence and confidence in ICT integration. The existence of effective training on ICT integration is important because it may expose instructors to practical knowledge and experiences that will help them to integrate ICT into their instructions. Arguably, cases, where such opportunities are not provided for academic staff, will affect how best they can integrate ICT into their instructions. Previous studies (Adarkwah, 2021; Turugare & Rudhumbu, 2020) have found that problems of quality and lack of resources serve as challenges to ICT integration for lecturers. The lack of resources and/ or tools makes the ICT integration difficult because, without key resources such as the internet, adequate computer, laptops, and interactive programmes such as Zoom, Skype, and instructional management systems, ICT integration will not be feasible (Mohammadi et al., 2021).

The school/institutional challenges that serve as challenges to ICT integration are safety and privacy issues, inadequate supply of infrastructure, inadequate continuous training, lack of consistent power supply, limited technical support, and schools' commitment to supporting online instruction and higher cost ICT devices. Again, the results present a holistic challenge

that regards ICT integration resulting from the school/institutions. When schools/institutions fail to provide technical support to instructors/lecturers on ICT integration, they may not continue the use of ICT especially if they face challenges beyond their control. Corroborating with previous studies ([Turgare & Rudhumbu, 2020](#)), the top barrier to ICT usage reported by Ghanaian university academics is the lack of technical assistance. The academic staff saw a lack of technical support as the pressing challenge they face when it comes to ICT integration. They also reported security and privacy issues in integrating ICT in instruction ([Owusu-Fordjour et al., 2020](#)). When instructors are not safe about the use of ICT in their lessons it will affect their commitment to integrating ICT. In addition, when schools/institutions are not able to provide the needed infrastructure and maintain a relatively stable power supply due to the high cost of acquiring such devices, ICT integration may not be possible ([Ofori, 2019](#)). This re-echoes the fact that the factors and particularly the school/institutional factors that affect ICT integration are cumulative and their contribution is detrimental to ICT integration. Particularly, an erratic power supply may cause dysfunction and sometimes cause the regular breakdown of ICT equipment. This raises the cost of maintenance and usage of ICT equipment thereby contributing to the challenges of ICT integration.

## LIMITATIONS

Although the study covered a relatively large sample size, it focused on university academics. Therefore, generalising the results of the study to academic staff in technical universities and colleges of education in Ghana should be done with care. Also, when the management of universities can provide measures to curb the reported challenges of online instruction and ICT integration in the future, the results of the study may be limited. Therefore, users of the reported challenges should be mindful of this while using or interpreting the findings of this study. The results of the study also emanated from the use of quantitative methodology, as a result, it is suggested that future research works consider the use of the mixed-method approach to provide holistic results on the study variables. Future researchers are also encouraged to consider investigating the variables of the current study but should focus on other public and private universities, technical universities, and colleges of education.

## RECOMMENDATIONS

Management of universities should provide the necessary ICT materials/ tools to aid online instruction and integration. This can be done by liaising with the government and donor agencies for the procurement of such materials.



Management of universities should also develop strategies to ensure constant electric power supply although they may not have a direct influence on the supply of power. Alternatively, they are encouraged to develop solar energy or procure power plants for that purpose. The government should also make it a priority to supply constant power to universities. Managers of universities should further organise effective training and capacity-building programs for instructors/ lecturers, especially in the use of applications such as Skype, Zoom, and instructional management platforms that are used especially in this era of COVID-19. This can be done by inviting experts to provide the needed training to expose instructors/ lecturers to practical knowledge of online instruction and ICT integration into instructions. Management of institutions should also provide technical staff to support instructors/ lecturers who may have challenges in the use of ICT resources, and this should be coupled with the provision of constant internet service as well as provide applications such as Zoom, Skype, and learning management systems for instructions. Instructors/ lecturers should be encouraged by the management of schools/institutions to exhibit the needed commitment and develop time to plan online instruction and integrate ICT into their instructions. The study also recommends that in providing solutions to the indicated challenges, efforts must be made to provide a holistic solution rather than solving the identified challenges in isolation.

## CONCLUSIONS AND IMPLICATIONS

We explored the challenges faced by academic staff of tertiary institutions in Ghana in online instruction and ICT integration in instruction amid the COVID-19 pandemic. Results from this study indicate that factors emanating from lecturers/instructors and schools/institutions serve as challenges to online instruction and integration of ICT Ghanaian Universities. The challenges in both online instruction and ICT integration largely come from the schools/institutions although some of them emanate from instructors/lecturers. The modest contribution of our study is that it serves large scale empirical evidence where academic staff in Ghana have been used to confirm the lecturers/instructors and schools/institutions' challenges that affect online instructions and ICT integration, especially in Ghanaian universities. The challenges uncovered from our results, therefore, present a more holistically way of becoming aware of such challenges which will facilitate a more holistic policy intervention by policymakers in higher education. Our findings also extend the discourse of technology acceptance and the use of ICT in facilitating instructions among academic staff. The prevalence of the challenges we have found will hinder technology acceptance among acceptance in this COVID-19 pandemic which will affect the effective integration of ICT in the teaching and

learning process.

We conclude that the challenges that have been reported to affect online instruction and ICT integration from the perspectives of the academic staff in Ghana do not operate in isolation. We imply from the findings that one challenge (either from instructors/lecturers or schools/institutions) leads to the other. For instance, when schools/institutions lack the financial resources, are unable to provide ICT resources and training programmes, or maintain a constant power supply, it will result in the availability and inadequate knowledge on how to use ICT resources on the part of instructors/lecturers who will lead to low commitment and competence. When instructors/lecturers exhibit a low commitment to online instructions, it will affect the time to be dedicated to planning online instructions which will also have a cumulative effect on their constant practice and ICT integration. This further implies that amid the pandemic, instructors/lecturers and schools/institutions in Ghana have a lot to do regarding online instructions and ICT integration although the greater burden is on the schools/institutions.

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