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Undergraduates' challenges as predictors of their readiness for online learning during COVID-19 in Botswana

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Abstract

This quantitative study identified challenges undergraduates faced in Botswana and predicted their readiness for online learning during COVID-19. A descriptive and correlational survey research design was adopted using the Technology Acceptance Model (TAM). A questionnaire was constructed for data collection from a randomly sampled 75 agriculture undergraduates (n=75) at the Botswana University of Agriculture and Natural Resources. A one-sample t-test demonstrated that undergraduates needed to prepare for online learning. They faced several significant challenges including slow personal laptops and devices, lack of interaction between students and teachers, lack of social interaction within a class, lack of immediate feedback and interruptions in lessons, disturbances during lessons, limited broadband data and frequent technology failures. A one-way ANOVA and independent t-test revealed no age, gender and study year differences among undergraduates for the readiness and challenges. Regression analysis determined lack of interaction in class, lack of suitable infrastructure and insufficient training to use the system are the challenges that predicted undergraduates' readiness for online learning. The preparation of undergraduates for online learning can be enhanced by improving the interaction during online lessons, developing the infrastructure required for online teaching and learning and offering training on the use of online teaching and learning systems.

Keywords: Challenges, COVID-19, E-learning, Higher education, Online learning, Readiness, Student perspectives, Undergraduates.

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Contents

Contribution of this paper to the literature

This quantitative study determined the challenges that predict the readiness of agriculture undergraduates for online learning in Botswana. It also provides information on the age, gender and study year differences in the readiness and challenges identified. Findings can be used for further research on the challenges and readiness of agriculture undergraduates for online education in developing countries particularly in the Southern African region.

1. Introduction

The COVID-19 pandemic has been considered a worldwide health emergency since the outbreak of the disease in China (Sohrabi et al., 2020; WHO, 2020). Every country has to implement effective measures such as lockdowns and school closures because physical separation reduces the virus's transmission. Therefore, face-to-face education was discontinued as a preventive measure to control the virus spread (Bardesi, Al-Mashaikhi, Basahel, & Yamin, 2021; Hoque et al., 2021; Hossain et al., 2021). All the education institutions worldwide were closed unexpectedly (Bardesi et al., 2021). Due to this sudden closure, the education institutions had no option rather than swiftly adopting online teaching and learning (Cheong, Coldwell-Neilson, Luo, & MacCallum, 2020; Sunita, 2020). Online teaching and learning was the only immediate measure to provide an alternative way of teaching and learning through online learning (Affouneh, Salha, & Khlaif, 2020; Bozkurt & Sharma, 2020) to sustain teaching and learning in an accessible and reliable way (Hodges, Moore, Lockee, Trust, & Bond, 2020). Consequently, education institutions in all countries switched to e-learning as a possible alternate to continue teaching and learning (Cheong et al., 2020; Pokhrel & Chhetri, 2021; UNESCO, 2020). Botswana and other countries were also severely affected by the pandemic. The Botswana government decided to close all education institutions on March 30, 2020 as a safety measure to reduce the spread of the disease in the country. Consequently, Botswana University of Agriculture and Natural Resources (BUAN) switched to online teaching and learning using several e-learning platforms including Microsoft Teams, Edu-Hub and Zoom.

This swift transition to e-learning had twisted unexpected educational experiences for stakeholders particularly students, teachers and their families (Day et al., 2021; Pokhrel & Chhetri, 2021). This swift change did not allow students and teachers a smooth transition for effective teaching and learning. Teachers and students were not ready to adapt to e-learning platforms (Joshi, Vinay, & Bhaskar, 2021; Oyediran, Omoare, Owoyemi, Adejobi, & Fasasi, 2020). Online education requires good preparedness and infrastructure such as access to the internet (Ali, 2020; Day et al., 2021; Murphy, 2020). Several institutions lack adequate human capacity and infrastructure for online teaching and learning (Wekullo, Shiundu, Ouda, & Mutevane, 2022) which cannot easily be developed overnight. Consequently, the swift transition emerged with several challenges for students and teachers during teaching and learning (Cheong et al., 2020). Limited internet connectivity, poor student-teacher interaction and frequent power interruptions were reported to be the major challenges in e-learning (Abbasi, Ayoob, Malik, & Memon, 2020; Kapasia et al., 2020; Kwary & Fauzie, 2018; Wekullo et al., 2022). Cost and slow internet connectivity are the barriers to access course materials in online learning (Mphahlele, 2023). A reliable internet together with other infrastructure such as electricity, hardware and software are the pre-requisites for online teaching and learning (Mazlan et al., 2021; Tsai et al., 2020). Online teaching and learning is more demanding than face-to-face teaching and learning. Students and academic staff need to have appropriate technical training to be able to use the online platform (Wekullo, Kabindio, & Juma, 2023).

Challenges in online teaching and learning during COVID-19 can be diverse and different for countries and institutions. Such differences can be contributed by several factors including socio-economic factors. Online teaching and learning in higher education institutions in Africa faces several challenges that have potential threats to the performance of the education system. Studies have indicated that some students were familiar and ready for online teaching and learning while others were not. Several studies have been done globally, scanty research is available in Africa. Furthermore, no such research in the context of agriculture undergraduates in Botswana has been documented. Therefore, this study aimed to analyze the readiness of agriculture undergraduates for online learning and to determine the challenges they face during online learning at the Botswana University of Agriculture and Natural Resources. The following are the study's objectives:

i. To determine the readiness of agriculture undergraduates for online learning and identify the challenges they face in online learning.

ii. To determine gender, age and study year differences among agriculture undergraduates in the readiness and challenges they face in online learning.

iii. To establish if challenges faced by agriculture undergraduates predict their readiness for online learning.

The objectives answered the research questions as follows:

i. Are the agriculture undergraduates ready for online learning and what are the challenges they face in online learning?

ii. To determine gender, age and study year differences among agriculture undergraduates in the readiness and challenges they face in online learning.

iii. Do the challenges faced by agriculture undergraduates predict their readiness for online learning?

The following research hypotheses were formulated to answer the research questions of the study:

H_1: The agriculture undergraduates are not ready for online learning and they face several challenges in online learning.

H_2: There are gender, age and study year differences among agriculture undergraduates in the readiness and challenges they face in online learning.

H_3: The challenges faced by agriculture undergraduates predict their readiness for online learning.

Findings of this study provide suggestions to policymakers, administrators and stakeholders in higher education on the challenges in online learning and potential solutions to improve the readiness of undergraduates for online learning. Finally, the findings help in mitigating the challenges and thus improving the readiness of undergraduates for online learning in Botswana. This study contributes to the literature on e-learning research to improve the effectiveness of online learning in developing countries particularly in sub-Saharan Africa.

2. Literature Review

The relevant literature review for this study is presented in the subsections as follows:

2.1. Theoretical Framework

Online learning is a well-known form of learning and uses web-based education tools such as the internet and digital platforms to deliver a lesson that enables the students to learn at their convenient time and place (Al-Busaidi, 2013). Several platforms are used for online teaching and learning such as Edu hub, Moodle, Teams, Blackboard, Google Class and Zoom. These online platforms provide access to all types of students whether they would like to learn as full-time, part-time or distance-mode learners (Azhari & Fajri, 2021). Online learning has been adopted by all countries. It is well-appreciated by teachers and students (Kwary & Fauzie, 2018) and has several advantages particularly for its accessibility, flexibility and affordability (Abbasi et al., 2020). Readiness for online refers to the willingness or eagerness to do something which often takes place over the internet and remotely rather than in a traditional classroom. Challenges in online teaching and learning are the factors that hinder students' readiness.

Online acceptance improves users' attitude towards adoption of a technology (Abuhassna et al., 2020). In the light of the shift in mode of teaching and learning during COVID-19, understanding students' experiences and views on adoption of technology is essential to identify challenges for developing appropriate strategies to improve students' readiness for online learning (Haleem, Javaid, Qadri, & Suman, 2022). Several factors such as challenges in use, ease of use (Hung, Chou, Chen, & Own, 2010), technological barriers and technical support (Liang, Zhong, Zuo, Luo, & Wang, 2021) affect the adoption and acceptance of learners for online learning. This study has adopted the Technology Acceptance Model (TAM) framework developed by Davis (1989). TAM guides on how the users adopt technology based on several factors such as ease of use and challenges in use. This framework has been extensively adopted and applied to various fields and has proven to be important to understand users' perceptions and behaviors on adoption of technology (Mugo, Njagi, Chemwei, & Motanya, 2017). Pérez, Martínez Sánchez, de Luis Carnicer, and José Vela Jiménez (2004) asserted that the TAM framework can be used to understand the learners' challenges and their readiness for online learning platforms. TAM highlights the importance of undergraduates' behaviours in the form of challenges in online learning and helps in understanding their readiness for online learning. Therefore, this framework provides a compass to navigate and understand the learners' perceptions of the challenges and their readiness for online learning during the COVID-19 pandemic.

2.2. Readiness of Undergraduates for Online Learning

Several studies have been reported determining the readiness of students for online learning. Chung, Subramaniam, and Dass (2020) examined online learning readiness among 399 students in a university in Malaysia and found that undergraduates were ready for online learning. Furthermore, male students were less ready as compared to their female counterparts. Internet connectivity and difficulty to grasp the content delivered were the major challenges. Chung, Noor, and Mathew (2020) used 91 students in Indonesia to analyze their online readiness for learning. The students were well-prepared for computer skills and were willing to learn online. Poor internet connectivity was determined as the most important challenge that students face. Neupane, Sharma, and Joshi (2020) assessed the readiness of 704 undergraduates for e-learning and revealed that the majority of students were ready for online classes. Furthermore, female learners were more ready as compared to their male counterparts. Mastor, Salleh, and Ibrahim (2021) identified the readiness level among students' readiness for online learning. Students were found to be moderately ready for online learning. Furthermore, motivating students towards online learning can boost their readiness for online learning. Kundu and Bej (2021) examined the perception of 100 Indian students towards the swift change to online teaching and learning and concluded that students were not ready for online education. They also faced various challenges in adapting to this overnight shift. Olayemi, Adamu, and Olayemi (2021) studied perceptions and willingness of 148 Nigerian students towards e-learning during COVID-19 and determined that most of the learners were ready for online learning.

Dehghan, Esmaeili, Paridokht, Javadzade and Jalali (2022) analysed e-learning readiness among 165 undergraduates during COVID-19 and reported that several undergraduates were ready for it. It was recommended that e-learning can be enhanced by motivating learners, providing appropriate infrastructure facilities and adequate training on online earning platforms. Nawi and Lee (2022) determined the level of 312 undergraduate students' readiness for online learning at University Sains Islam Malaysia and reported a medium to high level of readiness among undergraduates. Oktavia, Hartono, Widiyati and Hidayati (2023) surveyed to measure the readiness levels of undergraduates at Sultan Agung Islamic University and reported that learners had skills in application of e-learning systems. Ismail, Mat and Ali (2022) assessed the readiness of 120 students in Malaysian private university and determined that students were ready to learn online. Furthermore, Chathuranga and Dissanayake (2022) examined the level of readiness of the undergraduates at a university in Sri Lanka and established that the readiness for online learning is significantly influenced by several challenges including, technology skills of the student, availability of technology, access to infrastructure, communication skills and motivation for e-learning. This study further revealed that the level or year of the student's degree, type and quality of the device used and internet strength were some of the significant factors that influenced the readiness for e-learning. Ab Hadi and Wahab (2024) analyzed the readiness of undergraduates for using e-learning at Sultan Azlan Shah University and found that undergraduates were not ready for it at home due to a lack of family environment and support though they did not have a problem using the e-learning system at the university campus. These findings reveal that the level of undergraduates' readiness for online learning differs from country to country.

2.3. Challenges Faced by Undergraduates in Online Learning

Students' attitudes towards e-learning differ for several factors including their attitude, age groups and study year. The challenges in online learning may influence the readiness for online learning. Therefore, it is crucial to understand the challenges that students face in online learning. Olayemi et al. (2021) reported that costly internet

access, poor internet service, unreliable electricity supply, inaccessibility of online library resources and inadequate infrastructure such as computers were among the major challenges in online learning faced by 148 students in Nigeria. Jaradat and Ajlouni (2021) investigated 398 students' perceptions of online learning at the University of Jordan and revealed that students faced several challenges such as poor internet connectivity, slow functioning of e-learning platforms, lack of ICT skills and disturbance during lessons. Ullah, Ashraf, and Ahmed (2021) reported similar challenges faced by male and female students in the Pakistani higher education institutions. Barrot, Llenares, and Del Rosario (2021) identified challenges faced by the degree students during online learning and reported the poor learning environment at home as a major challenge while technological literacy and competency were among the least challenges they faced in online learning.

Shohel et al. (2022) examined higher education faculty and students' perspectives, challenges and preparedness for e-learning during COVID-19 in Kenya. Content analysis of the semi-structured interviews revealed that the teaching staff and undergraduates were not ready for the swift adoption to online teaching and learning and they faced several challenges including lack of internet, lack of training and lack of interaction during lesson. Moyo, Ngidi, Koai, and Lemeko (2022) surveyed of a tertiary institution to determine the students' experiences in online learning during lockdown period and identified lack of digital literacy, inadequate internet data, poor functioning of gadgets, lack of systematization and integration of technology as the major challenges. Saha, Pranty, Rana, Islam, and Hossain (2022) identified the most significant challenges for students during e-learning as difficult to do practical work, difficult to monitor students and ineffective feedback to learners. Some other apparent challenges were lack of student-teacher interaction, poor internet speed, poor participation during teaching and learning, lack of contents taught and insufficient feedback. According to the Hamad's (2022) systematic review, students faced several challenges as a result of the rapid adoption of online platforms. These included insufficient training and skills, insufficient and unsuitable infrastructure, a lack of interaction and a lack of feedback.

Chipamaunga et al. (2023) identified the most challenging factor among students in South Africa as the lack of knowledge and skill of the functioning of online learning platforms. A conducive family environment, a suitable place for study, better internet connectivity, uninterrupted electricity supply and the availability of appropriate devices were recommended to reinforce readiness for online learning. Abdul Wahab and Ab Hadi (2023) identified that undergraduate students faced difficulties integrating e-learning since their parents did not provide them with sufficient help at home to complete online lessons. Therefore, it was recommended that the students stay on campus or in the surrounding areas to achieve more effective e-learning. The major challenges that undergraduates in the Greek higher educational institutions faced in online learning during COVID-19 were the issues with internet connection and limited social interactions (Anastasakis, Triantafyllou, & Petridis, 2023). Yidana, Asapeo, Laar, and Linda (2023) reviewed the literature on the challenges faced by learners in online teaching and learning in Africa whereby 65 empirical studies conducted on higher education institutions in 25 Africa countries were reviewed. Findings revealed that online teaching and learning had challenges of lack of readiness to use online platform and inadequate ICT infrastructure among teachers. It was also revealed that poor internet connectivity, interrupted electricity supply, poor access to suitable devices and costly internet services had contributed to the poor participation of the learners in most of the African countries. The literature reviewed revealed several challenges faced by learners in online learning and have highlighted their readiness to adopt and use online learning platforms. The majority of the studies were conducted in developed countries (Hamad, 2022) and little information is available in the context of the African countries. Learners' preparation and the problems related to online learning are expected to differ depending on various kinds of socioeconomic conditions that vary from country to country. Therefore, there is a need to understand the challenges in online learning and the readiness of undergraduates for online learning in African countries enabling to improve the effective implementation of long-term strategies on online teaching and learning on the African continent.

3. Methodology

3.1. Research Design

This quantitative study adopted a descriptive and co-relational survey research design. A survey is useful for obtaining information on the participants' views and is less time-consuming as well as cost-effective (Creswell & Creswell, 2017). Survey research also provides an opportunity to solicit facts and information from the respondents (Biza, Nardi, & Zachariades, 2018). A situation or phenomenon can be described accurately by adopting a descriptive research design and also can determine the relationship between the phenomena under study (Creswell & Creswell, 2017). A correlational research design was found appropriate as it allows determining the relationship between two or more variables. Correlation design help to determine if the challenges in online learning predict the readiness of students for online learning. This study aimed to identify and describe the challenges in online learning and also to predict the readiness of undergraduate for online learning by correlating the identified challenges. A descriptive and co-relational survey research design was found suitable for this study.

3.2. Research Participants

The second, third, and fourth year undergraduate students enrolled in the undergraduate degree programs at the Botswana University of Agriculture and Natural Resources were treated as the population in this study. First-year students were excluded as they were not involved in online teaching and learning. An equal number of 25 undergraduates enrolled in their second, third, and fourth year degree programs were sampled using a simple random sampling method providing a sample of 75 undergraduate students (n=75). Out of the sampled undergraduates, 68.0% were males and 32.0 % were females. Most of the participants (84%) were less than 25 years old while 16.0% were above 25 years. The highest number of students (41.3%) was in their fourth year of study followed by 30.7% in the second year and 28% in the third year of study.

3.3. Instrumentation and Measurements

A questionnaire was constructed for data collection and had three sections. The first section included demographic information on age, gender and study year of the respondents. The second section had 20 items on

readiness of undergraduates for online learning while the third section contained 20 challenges faced by undergraduates. The items on the readiness and challenges were measured on a 4-point Likert scale: 1= strongly disagree, 2= disagree, 3= agree and 4= strongly agree. A panel of experts at the university validated the questionnaire while reliability coefficients were calculated to ascertain its reliability. The Cronbach's alpha reliability coefficients for the readiness and the challenges were calculated to be .825 and .901, respectively. Thus, the instrument is reliable as the coefficients were above the minimum threshold of .70 (Juneau et al., 2020) indicating that the data can be used for further analysis.

3.4. Data Collection and Analysis

Data was collected by surveying the sampled students using a questionnaire after obtaining research approval to perform this study from the Botswana University of Agriculture and Natural Resources, Gaborone, Botswana, and other research ethics. The questionnaire was administered by the researchers on the dates and times agreed to with the respondents. The respondents were given 45 minutes to respond to the questionnaire. The completed questionnaires were collected by the researcher for further processing and data analysis. The data were analysed using SPSS software version. 23. The following null hypothesis was tested to achieve the objectives of the study:

H_{01}: The agriculture undergraduates are ready for online learning and they face no challenges in online learning.

H_{02}: There are no gender, age and study year differences among agriculture undergraduates in the readiness and challenges in online learning.

H_{03}: The challenges faced by agriculture undergraduates do not predict their readiness for online learning.

A one-sample t-test was employed to determine the readiness as well as the challenges in online learning. An independent t-test and one-way ANOVA test were employed to determine the gender, age and study year differences in the readiness and challenges of online learning. Furthermore, a multiple regression analysis was employed to predict the readiness of undergraduates for online learning.

4. Findings

4.1. Determination of Readiness and Challenges of Undergraduates for Online Learning

A one-sample t-test was employed to determine the readiness for online learning as well as the challenges in online learning. One sample t-test was used to test the null hypothesis $H_{01:}$ The undergraduates are ready for online learning and they face no challenges in online learning. Table 1 reflects that undergraduates were not ready for online learning as the hypothesis was rejected (M = 60.44, SD = 7.73, t = 11.69, p=.000). Table 1 further shows that there are challenges in online learning faced by the undergraduates as the hypothesis was rejected (M = 52.93, SD = 11.23, t = 2.26, p=.027). Furthermore, a one sample t-test was employed to determine the importance of each of the 20 identified challenges which were ranked as per their importance (see Table 2).

Table 1. Readiness and challenges of undergraduates for online learning (df=74).

Variables	M	SD	T	MD	*P*
Readiness for online learning	60.44	7.73	11.69	10.44	0.000
Challenges in online learning	52.93	11.23	2.26	2.93	0.027

Table 2. Ranking of the challenges faced by undergraduates in online learning.

Rank	Challenges	M	SD	t	MD	*p*
1	Slow personal laptops and devices	3.07	1.08	4.821	0.567	0.000
2	Lack of interaction with other learners and lecturers	2.96	0.84	4.713	0.460	0.000
3	Lack of social interaction within class	2.93	0.95	3.954	0.433	0.000
4	Lack of immediate feedback	2.91	0.87	4.036	0.407	0.000
5	Interruptions in online lessons	2.85	0.89	3.416	0.353	0.001
6	Voice disturbances during online lesson	2.84	0.93	3.164	0.340	0.002
7	Limited broadband data	2.83	.94	3.024	0.327	0.003
8	Frequent technology failures	2.79	.98	2.542	0.287	0.013
9	Lack of motivation due to no face-to-face contact	2.68	1.09	1.427	0.180	0.158
10	Lack of gadgets for online learning	2.65	0.92	1.439	0.153	0.154
11	Lack of telecommunication infrastructure	2.63	1.04	1.058	0.127	0.293
12	Frequent power supply failure	2.59	1.07	0.704	0.087	0.484
13	Insufficient training to use the system	2.57	1.00	0.634	0.073	0.528
14	Difficult to understand the content delivered online	2.51	0.93	0.062	.007	0.951
15	Lack of understanding of operations of platform	2.49	0.78	-0.074	-0.007	0.941
16	Inaccessibility to online library resources	2.45	0.97	-0.414	-0.047	0.680
17	Lack of infrastructure	2.45	1.06	-0.383	-0.047	0.703
18	Lack of technical skills in using online learning	2.39	0.93	-1.057	-0.113	0.249
19	Poor quality of materials delivered online	2.28	0.88	-2.169	-0.220	0.053
20	Less confidence in online classes	2.07	0.89	-4.215	-0.433	0.000

Table 2 indicated that students perceived fourteen challenges in online learning to be important ($M \geq 2.5$). These challenges included slow personal laptops and devices, lack of interaction with other learners and lecturers, lack of social interaction within class, lack of immediate feedback, interruptions in online lessons, voice disturbances during online lessons, limited broadband data, frequent technology failures, lack of motivation due to no face-to-face contact, lack of gadgets for online learning, lack of telecommunication infrastructure, frequent power supply failure, insufficient training to use the system and difficult to understand the content delivered online (see Table 2). Table 2 further reflects that only eight challenges were found to be significant. These significant challenges are: slow personal laptop devices (M = 3.07, SD =1.08, p <.05), lack of interaction with other learners and lecturers (M = 2.96, SD =.84, p <.05), lack of social interaction within class (M = 2.93, SD =.95, p <.05), lack of immediate feedback (M = 2.91, SD =.87, p <.05), interruptions in online lessons (M = 2.85, SD =.89, p <.05), voice

disturbances during online lesson (M = 2.84, SD =.93, p <.05) and limited broadband data (M = 2.83, SD =.94, p <.05) and, frequent technology failures (M = 2.79, SD =.98, p <.05).

4.2. Gender, Age and Study Year Differences in Readiness and Challenges of Online Learning

Gender, age and year of study differences in the readiness and challenges of online learning among undergraduates were determined by an independent t-test and a one-way ANOVA by testing the null hypothesis H_{03}: There are no gender, age and year of study differences among agriculture undergraduates in the readiness and challenges of online learning. Findings of an independent test in Table 3 revealed no significant gender and age difference in the readiness in online learning were determined as the null hypothesis was accepted [t(73)= .720, p=.474)] and [t(73)= .-719, p=.474)], respectively. Moreover, no significant gender and age difference in the challenges in online learning were determined as the null hypothesis was accepted [t(73)= .867, p=.389)] and [t(73)= -1.204, p=.232)], respectively.

One-way ANOVA in Table 4 determined no significant difference in the readiness and challenges in online learning among students for their year of study as the null hypothesis was accepted [F(2,72) = .658, p =.521)] and, [F(2,72) = 2.980, p =.057)], respectively.

Table 3. Independent t-test of gender and age differences in readiness and challenges in online learning.

Variables	Variables or levels	n	M	SD	SE	t	*P*
Readiness	Gender						
	Male	51	60.88	6.92	0.97		
	Female	24	59.50	9.32	1.90	0.720	0.474
	Age						
	≤ 25 years	63	60.16	8.01	1.00		
	> 25 years	12	61.92	6.14	1.77	-0.719	0.474
Challenges	Gender						
	Male	51	53.70	10.14	1.42		
	Female	24	51.29	13.34	2.72	0.867	0.389
	Age						
	≤ 25 years	63	52.25	11.82	1.49		
	> 25 years	12	65.50	6.65	1.92	-1.204	0.232

Table 4. One-way ANOVA of year of study difference in readiness and challenges in online learning.

Sources	SS	DF	MS	F	*P*
Readiness					
Between groups	79.42	2	39.71	0.658	0.521
Within groups	4347.07	72	60.37		
Total	4426.48	74			
Challenges					
Between groups	713.25	2	356.62	2.980	0.057
Within groups	8615.41	72	119.66		
Total	9328.67	74			

4.3. Prediction of Readiness of Undergraduates for Online Learning

A multiple regression analysis was employed to test the null hypothesis for predicting the readiness of undergraduates for online learning. The challenges faced by undergraduates do not predict undergraduates' readiness for online learning. The null hypothesis was rejected which implied that the challenges in online learning are significant predictors of undergraduates readiness for online learning [F(3, 71)= 7.84, p=<.001)] (see Table 5). Table 6 reflects that the following three challenges were determined to be the significant predictors for readiness for online learning: lack of suitable infrastructure (β =-.282, t=-2.397, p=.019), lack of interaction in class (β=.374, t=3.309, p=.001) and insufficient training to use the system (β =-.300, t=-2.393, p=.019).

Table 5. Challenges as predictors of readiness for online learning.

Sources	SS	DF	MS	F	*p*
Regression	1101.21	3	367.07	7.84	0.000
Residual	3325.27	71	46.83		
Total	4426.48	74			

Table 6. Regression coefficients of the challenges as the predictors of readiness for online learning.

Predictors	B	β	T	*P*
Constant	62.980	----	20.817	0.000
Lack of suitable infrastructure	-2.101	-0.282	-2.397	0.019
Lack of interaction in class	3.044	0.374	3.309	0.001
Insufficient training to use the system	-2.313	-0.300	-2.393	0.019

Note: R = 0.499, R^2 = 0.249.

5. Discussion

This study evaluated undergraduates' preparedness for online learning, the challenges they faced and determined whether the difficulties they faced could have an impact on their preparedness for online learning in COVID-19. The findings revealed that undergraduates were not ready for online learning. There was no age, gender or study year difference for readiness among undergraduates. Several other studies have reported similar findings that students in higher education institutions were not ready for online learning (Chung, Noor, et al., 2020; Kumari & Jayasinghe, 2021; Nawi & Lee, 2022; Neupane et al., 2020). On the other hand, several researchers

reported contrary findings (Kundu & Bej, 2021; Olayemi et al., 2021). The contrary findings can be contributed to by several factors including the attitude of students towards online learning and knowledge and skills in using the online platforms (Rohayani, 2015), self-competence, financial ability and comfort with online learning (Hasani, Adnan, Sensuse, & Suryono, 2020), availability of technology and level of training (Khairuddin, Arif, & Khairuddin, 2020), family environment at home and affordability of required infrastructure such as study space, internet, electricity and computers (Keser Aschenberger, Radinger, Brachtl, Ipser, & Oppl, 2023). Adams, Chuah, Sumintono, and Mohamed (2022) found students were ready for e-learning but male and female undergraduates have differences for online learning readiness. Contrarily, Tang et al. (2021) and Chung, Noor, et al. (2020) indicated that all the undergraduates were not ready for online learning. The gender differences in readiness for online learning might be contributed by several factors such as lack of finance, poor availability of suitable technology, poor internet, lack of electric supply and family environment.

Out of the twenty challenges, only eight were found to be significantly important such as slow personal laptops and devices, lack of interaction with other learners and lecturers, lack of social interaction within class, lack of immediate feedback, interruptions in online lessons, voice disturbances during online lessons, limited broadband data, and frequent technology failures. Similar findings were reported by several other researchers such as slow internet and laptops (Shohel et al., 2022), poor functioning gadgets (Moyo et al., 2022), poor internet connectivity and insufficient feedback (Saha et al., 2022), limited access to computers and poor internet service (Olayemi et al., 2021), poor internet connectivity (Chung, Noor, et al., 2020; Wekullo et al., 2022), poor student-teacher interaction, lack of student engagement, less participation of students and insufficient feedback (Saha et al., 2022). Students experienced challenges in online learning include poor network connectivity, a lack of digital and technical skills and poor technological support (Shrestha, Haque, Dawadi, & Giri, 2022). Rotar (2022) and Kaushik and Agrawal (2021) assert that digital skills contribute to learners' readiness for online learning despite the technological infrastructure which included reliable internet connectivity, computer devices and software. Bringula, Reguyal, Tan, and Ulfa (2021) and Kansiime and Batiibwe (2023) found that poor internet and unreliable power supply were the major challenges in online learning. Mazlan et al. (2021) and Tsai et al. (2020) argued that a proper internet connection is crucial for effective online teaching and learning. Furthermore, better internet connectivity, an uninterrupted electricity supply and the application of appropriate devices can reinforce readiness for online teaching and learning (Chipamaunga et al., 2023) and Shrestha et al. (2022).

The findings established that male and female undergraduates faced the same challenges in online learning (Ullah et al., 2021). Undergraduates despite their age and year of study face the same challenges in online learning. Some parts of Botswana particularly the interior villages still have a lack of reliable electricity supply and internet services which hamper smooth online teaching and learning. Among other, skills on online platforms, attitude of learners and family environment such as a lack of appropriate space for study at home may have an influence on their readiness for online learning. Education institutions worldwide rely on the internet for conducting online lessons (Ali, 2020; Day et al., 2021; Murphy, 2020) which highlights the importance of access to infrastructure such as appropriate software and hardware and a reliable internet connection to enable an effective online teaching and learning (Peimani & Kamalipour, 2021). Therefore, it is crucial that students have access to appropriate infrastructure, reliable internet connectivity and the required devices for effective online education. Providing online feedback to students has several benefits and should be an integral part of online education (Van Popta, Kral, Camp, Martens, & Simons, 2017).There are students in an educational system with various skills and learning benefits may only be attained when students obtain timely and constructive feedback. Therefore, there is a need to determine effective but practical strategies for providing feedback on students and improving the feedback mechanism (Yang, Mak, & Yuan, 2021). Poor internet, poor supply of electricity, interaction among teachers and students, lack of practical work and lack of access to appropriate devices are the major challenges in online teaching and learning across the African continent (Yidana et al., 2023). Therefore, it is crucial to ensure the availability of these basic amenities for e-learning to boost the digitalized teaching and learning in Africa.

Three challenges were determined as the predictors of readiness for online learning such as lack of suitable infrastructure, lack of interaction in class and insufficient training to use the system. The pandemic forced the education institutions to a sudden swift to online teaching and learning but the institutions did not have adequate capacity and infrastructure and had no time to prepare for it which had implications on the readiness for online learning (Wekullo et al., 2022). Poor internet connectivity, lack of suitable devices and necessary infrastructure are the major challenges influencing online teaching and learning (Ferri, Grifoni, & Guzzo, 2020). As lack of skills and inadequate technological infrastructure can influence the readiness of students for e-learning, appropriate training and skills on the application of the online system can improve their readiness for online learning (Munyaradzi, Mildred, & David, 2022). Abbasi et al. (2020) and Kwary and Fauzie (2018) found that lack of interaction in an online class is a common challenge for the readiness and effectiveness of online teaching and learning. Interaction in class refers to the interaction between students and teachers. Improving the interaction in class has a positive effect on the success of online teaching and learning (Baber, 2022). Limited time for interactions and lack of appropriate training on online platforms can significantly affect the readiness for online learning (Shohel et al., 2022).

Online learning cannot produce the desired results due to lack of interaction with teachers, no class socialization and no proper technical skills (Xia, Hu, Wu, Yang, & Lei, 2022). Furthermore, lack of social interaction not only affects students' satisfaction level but can cause psychological complications of depression and fear of loneliness which can affect negatively their readiness for online learning (Azmat & Ahmad, 2022). The readiness for online learning can also be improved by improving the efficiency of students in using the equipment and technology used in online teaching and learning (Luo, Lin, Huang, & Zhou, 2023) and can be accomplished through proper training (Al-Adwan & Smedley, 2012) and should be focused on technological skills, motivation and time management skills (Ahmmed, Saha, & Tamal, 2022). Students can be motivated towards online learning by providing the required infrastructure and appropriate training (Dehghan et al., 2022). Thus, training can be instrumental in improving the readiness and effectiveness of online teaching and learning.

6. Conclusion

This study analyzed the readiness of agriculture undergraduates for online learning during COVID-19, identified the challenges they faced in online learning and also determined if the identified challenges predicted the readiness of undergraduates for online learning. Findings revealed that the undergraduates are not ready for online learning and they faced several challenges in online learning. Out of the challenges identified, only eight were found to be significantly important such as slow personal laptops and devices, lack of interaction with other learners and lecturers, lack of social interaction within class, lack of immediate feedback and interruptions in online lessons, voice disturbances during online lesson and limited broadband data and frequent technology failures. No gender, age or year of study difference was determined among undergraduates for their readiness and challenges in online learning indicated that all undergraduates, despite their gender, age group and study year, perceived the same level of readiness and also faced the same challenges in online learning. Lack of suitable infrastructure, lack of interaction in class and insufficient training to use the online system were the three challenges predicting the readiness of undergraduates for online learning.

7. Recommendation and Implications

The readiness for online learning among undergraduates, irrespective of their age, gender and study year can be enhanced by developing the suitable infrastructure and facilities required for online teaching and learning by improving the online interaction among students and teachers and by providing adequate training to the students and teachers on the application of online teaching and learning platforms. Strategies should be developed to improve online class interaction among students and teachers by introducing interactive smart boards, accommodating practical work and providing constructive and timely feedback to the students. A qualitative study is recommended to explore the views of teachers and students on the detailed potential logistics and strategies to improve the readiness of undergraduates for online learning. Findings of this study have policy implications for the stakeholders in higher education. Appropriate infrastructure required for online teaching and learning should be strengthened ensuring the availability of appropriate devices such as e-learning smart boards, laptops, high speed internet connectivity and reliable electricity supply. A well-planned training program should be developed to train teaching staff and the students on the application of e-learning platforms. Finally, the major implications of the findings are centered on the development of infrastructure and training facilities required for an effective online teaching and learning environment which have financial implications for the education system.

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