

The Influence of COVID-19 on Students' Learning: Access and Participation in Higher Education in Southern Africa

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Abstract: Recent experiences of institutions in COVID-19 have heightened the need for research on its impact on higher education institutions globally. This article's authors are from higher learning institutions in Botswana, South Africa and Zambia, which used a blended learning model before COVID-19. Most of their students used the traditional part of blended learning, depending on the print, postal service, and face-to-face. These students' access and participation in learning during COVID-19 were negatively affected. Using Digital Equity as a framework, this paper explores the influence of COVID-19 on students' access and participation in online learning. There seem to be significant disparities in access and participation in high-quality technologies and severe educational inequities. This digital inequality impact calls for civic awareness in digital literacy among the citizenry if the gap between the rural and urban, have and have not digital immigrants and digital natives are to be bridged.

Keywords: access, digital awareness, digital equity, digital knowledge, digital literacy, online learning.

Introduction

The COVID-19 pandemic struck the world when higher learning institutions in many countries were involved in the on-going process of globalisation, demographics, and the rapid pace of technological advancement to broaden access to lifelong learning opportunities. According to Yang, Schneller, and Roche (2015), the process of globalisation was to ensure that education and learning are available to a diverse student population. In some instances, the shift towards online learning brought uncertainties that seemed to affect diverse student populations (Montacute & Holt-White, 2020). These uncertainties include having to leave the university and study in home conditions that were likely to differ considerably, with less well-off students more likely to be living in cramped housing conditions, perhaps without adequate access to the technology needed to complete their work, or trying to work alongside dealing with difficult financial situations at home. Against this background, this paper aims to:

- establish the influence of COVID-19 on student learning
- explore students' access and participation in higher education during COVID-19



- describe the importance of Digital Equity for access and participation in online learning.

Background

This paper is based on three case studies from three institutions situated in South Africa, Zambia, and Botswana, which gradually adjusted from blended learning to the fully online learning mode before COVID-19. The majority of students in these institutions reside in remote rural areas with limited resources and Internet connectivity. They relied mostly on face-to-face, print, and postal service for participation in learning activities. The sudden closure of learning institutions due to COVID-19 forced these institutions to move immediately into a fully online learning space. As much as some institutions saw online learning as the best method to give the student access to education and to enable participation, Teymori and Fardin (2020) affirm that online learning has its specific issues and challenges, including unfamiliarity with new technology and methods of dealing with unknown challenges, for many academics and universities.

Teymori and Fardin (2020) further remark that during COVID-19, online learning provided access to education for many students but stressed the importance of increased digital awareness. This paper uses digital equity to explore students' experiences in the three universities' access and participation in online learning, where digital awareness is one of the components of digital equity. Digital awareness is perceived by Reimer (2017) as much more than just knowing how to use a computer. He describes digital awareness as an act of understanding and utilising technology in an increasingly interconnected world.

In studies that present problems associated with the transition from conventional (face-to-face) learning to online learning Aboagye (2020) discovered accessibility issues due to connectivity, and Dhawan (2020) highlighted participation issues where students felt unengaged. With this background, it is evident that COVID-19 has influenced student learning in one way or another. In the next section, we use the literature on empirical studies to explore the influence of COVID-19 on student learning.

Literature Review

In this section, we share our understanding of the existing research and debates around the influence of COVID-19 on student learning, in particular focusing on higher learning institutions. We sampled two studies conducted in 2020, which were about the influence of COVID-19 on students. The first study we selected was conducted by Gonzalez et al (2020), in which they aimed to identify the effect of COVID-19 confinement on students' performance. They used a quantitative experimental design to prove or disprove the hypothesis formulated as COVID-19 detention significantly impacts students' performance. Gonzalez et al's (2020) participants were students who registered for "Applied Computing" and "Metabolism." For the experimental group, they sampled students who were registered in the 2019/2020 academic year. For the control group, they sampled students of "Applied Computing" and "Metabolism" from the academic years 2017/2018 and 2018/2019 and students of "Design of Water Treatment Facilities" from the academic year 2017/2018. In the case of "Design of Water Treatment Facilities," a longitudinal study has been performed in the academic year 2017/2018 to analyse the effect of rewards in the students' learning strategies, especially those related to time management. In the longitudinal study of "Design of Water Treatment Facilities," the experimental group corresponds to the third stage of the research. The findings from Gonzalez et al's (2020) study

revealed significant differences between students' performance in confinement with the performance in previous periods where activities were not limited to distance learning. However, Gonzalez et al (2020) could not confirm if the difference is either the new learning methodology or the new assessment process.

The second study was conducted by Aucejo, French, Ugalde Araya, and Zafar (2020) at Arizona State University in the US using an instrument to discover the pandemic's causal impact on students' current and expected outcomes. Aucejo et al (2020) surveyed approximately 1,500 students who were programmed in Qualtrics. They collected data on students' demographics and family background, their recent experiences (both for academic outcomes and non-academic outcomes), and their future expectations. Importantly, for this study, the survey collected data on what these outcomes/expectations would have been in the counterfactual state without COVID-19. The findings revealed that 13% of students had delayed graduation due to COVID-19. The most interesting result was the negative economic and health impacts of COVID-19, which have been significantly more pronounced for less advantaged groups, and that these differences, according to Aucejo et al (2020), can partially explain the underlying heterogeneity that they documented. Aucejo et al's (2020) study results suggest that by focusing on addressing the economic and health burden imposed by COVID-19, as measured by a relatively narrow set of mitigating factors, policymakers may be able to prevent COVID-19 from widening existing achievement gaps in higher education.

From the two studies, this paper identifies the following factors as those that most influenced students' learning during COVID-19: lockdown or confinement, which led to distance learning and socio-economic issues.

Lockdown or Confinement which led to Distance Learning

Most countries went into lockdown between March and May 2020, leaving the educational institution with a pedagogical shift from their traditional methods to online education, which only catered to distance learning. Mishra et al (2020) adopted Lewin's (1958) three-step process of change management theory (unfreezing → changing → refreezing) to deal with the paradigm shift to distance learning. Mishra et al (2020) argue that the refreezing step is inevitable for integrating technology in the teaching-learning process that enables one to teach students with the methods they would feel comfortable with and match the demands of 21st-century technology. On the other hand, Dhawan (2020) highlights some disadvantages that online distance learning may have on students, such as limited interactions and fewer practical activities. Dhawan stresses that sometimes, online content is theoretical and does not let students practice and learn effectively. The rapid distance learning caused by COVID-19 for some students in rural areas negatively influenced various communication kinds that distance learning implies due to the network's weakness. The lockdown, which was meant to enforce the COVID-19 protocols of social distancing, hindered access to schools and teachers. This was necessary to reduce transmission and to flatten the curve (UNESCO, 2020).

Socio-economic Issues that Affected Learning During COVID-19 Lockdowns

As indicated in the previous section, all educational institutions had to close, compelling those who were teaching face-to-face to adapt to the distance learning mode. Most students who were staying closer to institutions for ease of access to university resources had to move back home, where some have overcrowded households that make it difficult for one to have space to study. In certain areas

there is a lack of or limited Internet connectivity and electricity. Stelitano et al (2020) affirm the disparities in Internet access for households with higher poverty levels and rural areas which affected student engagement during COVID-19. On a positive note, Hedding et al (2020) presented some of the South African educational websites' remedial efforts by declaring their sites data-free to students. However, Hedding et al (2020) cautioned that there were still difficulties for students living in remote areas where the electricity supply is inconsistent, and network coverage is inadequate despite the remedial efforts.

Students' Access and Participation in Higher Education During COVID-19

Access to higher education has been a dominant feature in the literature even before COVID-19, with some identified barriers such as location and distance from the university, financial pressures, and other social problems (Mphahlele, 2020). In the same vein, Seneviratne (2020) acknowledges that access to higher education has always been a challenge for governments and universities, but the COVID-19 pandemic and attempts to shift to online learning have been a setback, not just for access but also to ensure that all groups thrive and succeed in higher education. The studies mentioned below reported some experiences that affected students' access and participation in online learning during COVID-19:

- Rainford (2020) discussed technological inequalities focusing on analysis done by Clements (2020) about the Southern Universities network and concluded that even when households do have broadband connections, they may be of limited speed
- Mishra et al (2020) highlighted the difficulties experienced during online practicals, which required systematic demonstration of the whole process in the students' presence.

This paper notes that access and participation in higher education during COVID-19 focused mainly on digital access and online participation. Digital access during COVID-19, as reported by Mphahlele (2020), was affected by, amongst other things, the financial ability to have technology in the home because of socio-economic status, disabilities, and physical location. Online participation was mostly affected by limited, or lack of, digital knowledge, awareness, and digital skills due to unequal access and opportunity to access digital tools and resources. UNESCO (2018) defines digital skills as the ability to use digital devices, communication applications, and networks to access and manage information. Against this backdrop, we identified digital equity as a suitable lens through which to explore the experiences of Mathematics second-year students' access and participation in online learning.

Methods

This paper is based on three case studies of students registered in an Open and Distance Learning (ODL) university in Botswana, South Africa or Zambia. We generated data from the students' queries, which were sent through emails and discussion forums. For this paper, we selected only queries that reflected the influence of COVID-19 on students' learning. As highlighted in the section above, we used digital equity as a framework to explore the influence of COVID-19 on students' learning. The influences are presented through the three components of digital equity, namely, digital access, awareness, and knowledge.

The Sample

Each author used the queries generated from the students in their modules. We selected one module each. Figure 1 below illustrates the sample students from which the queries were extracted.

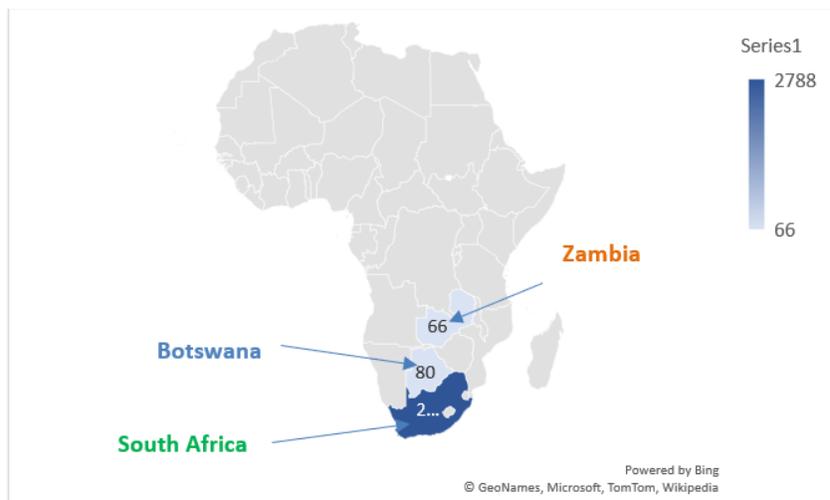


Figure 1: Sample from each case study

Data Collection and Analysis

Each author randomly extracted queries from the emails he or she received from students as well as from the discussion forums or chatrooms of the Learning Management Systems. We used the following criteria to select the queries that would respond to this paper:

- Digital access
- Digital awareness
- Digital knowledge

The Scale

The extracted data was sent to the first author to generate codes on it using Atlas.ti. We generated quotes using the three digital equity framework components (digital access, awareness and knowledge).

Table 1: Number of quotes generated from Atlas.ti

Codes	Botswana	South Africa	Zambia
Digital awareness	10	111	21
Digital knowledge	21	150	27
Digital skills	15	175	32
Total	46	436	80

It should be noted that the quotes in Table 1 were generated from the queries selected as per the three components of the digital equity framework. To ensure the reliability of the codes, the fourth author performed co-coding to ensure intercoder reliability of the data. Although, Mouter (2012) acknowledges intercoder reliability when manual coders are used instead of utilising text software such as Atlas-ti, we argue that as long as two different researchers coded the same body of content and generated similar codes, the codes are reliable. We also used Cohen's kappa coefficient as emphasised by Mphahlele (2018) to measure intercoder reliability. All the codes in Table 1 show strong intensity because Cohen's kappa coefficient levels of intensity are the following: (0) = no mention – the theme is not expressed in any way; (1) = suggested mention – suggestive of the theme; (2) = basic mention – a clear mention of that theme; and (3) = emphatic mention – a mention with a strong emphasis or great intensity.

Confidentiality and Anonymity

We used pseudonyms to identify the students and used the abbreviated country name and the number at the end of the name. For examples, BO Student 1 – for the first Botswana student. SA Student 1 – for South African student. ZA Student 1 = Zambian student.

Botswana Case Study

Students' Digital Awareness

Students' awareness is essential for the facilitation of online interaction, which is a critical component of online learning. One can conclude that when online learning was prioritised and rolled out at BOU, some students lacked digital awareness of what it entailed. Looking at their learning space, the MOODLE, students have left many tasks incomplete. They would often respond to tasks but fail to click on "Submit" to complete the tasks. Failure to submit will render the student getting a 0 (zero) for the work. However, there were a few students that accessed the discussion forums and offered guidance to others, as evidenced by the below conversation:

I think the quiz is all about leadership in an org. How do you lead, the style you employ (techniques). If some of your techniques are not working, how do you overcome them? Student 4.

Attempt 2 can be done even the next day or any other day before the quiz closes ... BO Student 4.

Some of the students missed tests that were scheduled for specific dates as well as other assessment components. Others indicated that they struggled to find the necessary information and instruction for various assessment components and items through their discussion forums. The struggle is evident in the below discussion:

Has there been any progress or information on something which is supposed to begin today ... Mook or Mock something... Student 2.

Help me, and I cannot manage to log in, just shows that it is an invalid login. BO Student 3.

How am I supposed to give an example now that the quiz is closed ...? BO Student 5.

They were also unable to submit their completed works. Of interest is that some students, most of whom are quite elderly, struggled to use other gadgets such as smartphones for learning instead of their preferred laptops.

Students' Digital Knowledge

With the introduction of online learning, it was clear that students had problems accessing online reading resources. For graduate programmes, students can access online resources as they predominantly use journal articles for their assignments. These articles are accessed through various resources, and students need to navigate the Learning Management System (LMS) to access them. Since some students lacked the necessary knowledge to access the portal and navigate through to access these journals, they usually missed their assignments. The quotes below represent some of the frustrations from students who were just introduced to online learning:

So, what happens if one failed to do all forums? BO Student 1.

I do not have marks for forum two, but I fully participated ... BO Student 2.

I do not even know how to access the student mail ... BO Student 6.

Students' Digital Skills

Accessing and navigating the LMS remained a serious challenge. Some students were unable to access and navigate the portal. These students not only missed most of their content. They also missed online assessments such as chats and discussion forums as well as quizzes. Others would access them but failed to do only what was necessary to complete tasks. This failure was mainly because most of them did not follow the instructions that were provided to guide them. Some struggled to complete tasks due to their limited digital skills. Students prepared and completed their Microsoft Word assignments but then failed to upload and submit them for marking and grading. They were also unable to structure their works correctly; for instance, they could not justify their text, could not space, used different font types and sizes for a single document, at times in the same paragraph. Submitting attachments was also generally a challenge. Students would submit unlabeled assignments without cover pages.

South African Case Study

As a lecturer in one of the ODL universities in Southern Africa, I have used blended learning as a delivery model for the past two years. The university gradually moved into the fully online teaching mode when COVID-19 interrupted teaching and learning activities. COVID-19 catalysed the gradual movement fully online because the university had to stop all print media and focus on a digital media. The first thing I noticed from the students' communication in the Learning Management System (LMS) was their limited digital knowledge, as Table 1 recorded 150 codes based on lack of or limited knowledge. Digital knowledge, according to Bélisle (2006), is knowledge not only accessed through digital tools but also partially processed through digital tools. Digital knowledge is evident when one can access information (such as databases, digital libraries, or simply the Web) and cope with details of immeasurable quantities, with significant levels of complexity, accessible at incredible speeds. For consistency with other case studies, digital awareness is discussed first before digital knowledge.

Students' Digital Awareness

Based on the queries raised by SA students in the previous section, it is safe to conclude that some lack or have limited digital awareness:

... I am unsure of where to find the information to answer the question in this learning unit. Do we do our research and google the different games, or are we supposed to use specific given information? (SA Student 4)

Kindly share how you reached your activities; that is, if you are using a phone, my phone does not show all the tools. (SA Student 5)

... It is my third attempt to submit my activity, the checklist. First, the attachment was not attached, and the 2nd and third times, it loads someone else's work. (SA Student 6)

... I am still confused I do not know where to submit my work; I saw other students submitting activities 1 and 2; where can I find them? (SA Student 7)

..., where can I get the template to the PowerPoint? (SA Student 8)

...I do not have a laptop for now to do all the activities; lockdown is really affecting me.can I submit all the activities later when I am sorted with a laptop. (SA Student 9)

Students' Digital Knowledge

The limited, or lack of, digital knowledge in some SA students was evident through learning activities that were required of them, such as online quizzes:

... please kindly assist. I read somewhere students talking about true/false questions but am lost. (SA Student 1)

... I have read the study guide, and I see the activities, but I have a problem with where to do the activities. (SA Student 2)

Apologies for asking on every discussion topic on how to access the learning unit activities. I am struggling to find it; as soon as I click on this module, it shows my announcements, assessments, discussions, and so forth, but it does not show anything about online assessment or learning units. (SA Student 3)

These are some of the quotes from the discussion forum. The lack of digital knowledge made the SA students fearful, and they were afraid to fail the module.

Students' Digital Skills

Some SA students seemed to have challenges completing certain activities due to limited digital skills:

I worked through my PowerPoint presentation, but now m struggling to upload it. When I try to upload, it says file empty. I do not know what I am doing wrong. (SA Student 10)

Good evening Mam, I am trying to work on the activity of bridging through 10 to add and subtract, and I am not very good with computers. Is there a particular software I can use to make the number lines and draw my bridge? (SA Student 11)

Evening, I cannot find where I should upload or submit my presentation for this learning Unit 3. (SA Student 12)

I was done with the clip a long time ago, but it cannot be published even if I use other people's laptops. From my side, I play it plays but to publish is a problem. (SA Student 13)

Zambia Case Study

Students' Digital Awareness

Socio-economic factors appear to have played a significant role in disabling students' digital awareness, affecting their access to and utilising e-learning services. For instance, ZA Student 14 observed that:

Lack of resources to buy internet bundles has become the order of the day for most of us students from underprivileged homes. (ZA Student 14)

Equally, socio-economic factors manifested themselves in a poor learning home environment, as further noted by ZA Student 14,

Lack conducive home environment is also among the challenges I am personally facing when it comes to e-learning. I come from a low socio-economic status background. (ZA Student 14)

In addition, ZA Student 17 retorted that:

Being the oldest child means that I have to take care of my younger siblings, especially during my parents' absence. I missed my class that day because, being the eldest child, I was obliged to attend to our guest. (ZA Student 17)

ZA Student 17's concerns were re-echoed by ZA Student 19. She retorted that:

I do not work; my parents do not even manage to cater to the whole family from 1 to 30. Furthermore, to make the situation worse am a female by nature, and it is hard for me to have a 10k for bundles.... . (ZA Student 19)

ZA Student 21 shared her account regarding the challenges associated with her socio-economic status concerning e-learning. She observed that:

my personal e-learning experience has not been good. I do not have enough time to do work. It is quite difficult for me to pick on my studies, plus we get much more assignments than in normal class. (ZA Student 21)

Students' Digital Knowledge

ZA students' low socio-economic status was compounded by the poor Internet connectivity in most rural areas, as reported by several students who could not benefit from the e-learning initiative. For instance, ZA Student 14 noted that:

Students like me without reliable internet access because of a network problem; internet connectivity in Kalomo district, the southern part of the country where I come from, is still in its infancy. (ZA Student 14)

Internet connectivity challenge was equally faced by ZA Students 16 and 19. For ZA Student 16, she noted that:

... the internet was the biggest challenge around now. Limited internet is due to the constraints in finances as the service providers have excessively increased the price for Data Bundles and the

network failure in places like Kabwe where we have no good internet connection. (ZA Student 16)

While ZA Student 19 observed:

Another challenge I am facing is a poor network. How does the government expect me to learn effectively with such poor network coverage? Every time I tried to log in to my Moodle account, the network trips irritated me much. (ZA Student 19)

Further, ZA Student 17 recounted from her experience that:

During the lecture, the network goes down, which further interrupts the lecture; by the time I get back online when I am done trying to reconnect, I would have missed important points explained by my lecturer. Sometimes the network is so bad that I missed an entire lecture. (ZA Student 17)

Students' Digital Skills

Digital immigrants' syndrome entails a negative attitude to e-learning devices due to failure to adapt to the digital era's demands. This syndrome was noted among learners and staff in Zambia. For instance, ZA Student 14 argued that:

Many of our lecturers are just sending assignments and learning materials on moodle; there is no direct interaction between learners and lecturers. (ZA Student 14)

In the same vein as ZA Student 14, ZA Student 20 noted that:

The other challenge I am facing with this e-learning is that online instructors tend to focus on theory rather than practice. It is not easy to understand some of my lessons in other courses because my other courses require practice, not just being given notes that I cannot understand independently. The challenge of e-learning has made me struggle to adapt to it because I was used in a regular classroom. (ZA Student 20)

Similarly, to ZA Students 14 and 20, ZA Student 15 reflected on the student side as follows:

It is tough for me to understand fully because I mostly understand better through face-to-face interaction. Studying from e-learning resources is very hard for me because I do not understand what is being taught by the lecturer. (ZA Student 15)

Given the challenge of erratic electricity power supply and poor Internet connectivity, ZA Student 23 explained how she managed to use social media to mitigate the associated e-learning challenges:

The only advantage is that some courses in my study program have WhatsApp groups update me on the lessons and assignments given to those accessing Moodle. Also, only two lecturers have given out their email addresses to submit my assignment as an unregistered student. As a female, I have to look at other responsibilities in a home, such as house chores that would take most of my time. Hence, having less time to study the recently shared notes in the WhatsApp group. (ZA Student 23)

Discussions and Conclusions

From the results presented above, this paper identifies the following as important to digital equity for access and participation in online learning: access to digital information, equal access to technology, and closing the digital divide. The importance of digital equity is used in themes to discuss the results in the section below.

Access to Digital Information

Based on the findings, it is evident that many students are unable to find information on various digital platforms. Although these pre-service teachers' inability might be because of other factors such as socio-economic circumstances, one must acquire digital knowledge to navigate digital platforms with ease. The study conducted by Kajee and Balfour (2011) reported that most students did not have digital access at school or home. More than nine years later, in 2020, it is still evident that students' access to digital information remains a serious challenge. The lack of digital knowledge is not unique to the students of the University of South Africa. Adult students enrolled with the BOU face similar challenges, as evidenced by students' conversations 2, 3 and 6. What remains a mystery, though, is that most students have computers and smartphones. However, they use them only for other things and not for teaching and learning. They do not consider these learning tools, and this has to be demystified for them to appreciate that their mobile devices can also be used for learning. Another challenge for students, especially those from the lower socio-economic strata, is the poor quality of Internet network coverage in rural areas as well as an insufficient electric power supply, as noted by pre-service teachers 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23. The issue of insufficient electric power supply was also researched by Muleya et al, 2019; Simui et al, 2018; and Simui, Nyaruwata, and Kasonde-Ngandu, 2017, who noted the presence of digital immigrants in higher education Zambia and also highlighted the challenge of poor Internet connectivity especially in rural Zambia where the bulk of students reside.

Equal Access to Technology

The academic literature on students' access to technology has revealed that digital access can measure students' level of participation in online learning. Therefore, a lack of equitable access to technology and information deprives students of participation in teaching and learning activities. Access to technology is more than just providing devices and connectivity to students. It also involves making sure every student is aware of various digital tools that can be used in digital spaces because the absence of awareness can negatively affect learning access. SA students 4, 5, 6 and 7 struggled because of the lack of digital awareness. The lack of digital awareness also applies to students enrolled with BOU. Therefore, it remains imperative for institutions to train their students to use their gadgets as learning tools effectively. The need to train students calls for civic awareness in digital literacy to bridge the gap between the rural and urban and the rich and poor if e-learning initiatives are to take root in South Africa. These observations are also echoed in the works of the other scholars among them (Muleya, 2017a, 2017b, 2018a, 2018b, 2019; Bergersen & Muleya, 2019; Machila et al, 2018; Magasu, Muleya & Mweemba, 2020; Mupeta et al, 2020; Habanyati et al, 2020; Mwase, 2020; Mwanangombe, 2020).

Bridging the Digital Divide

Bridging the digital divide should be viewed as just digital freedom and an attempt to improve diverse populations' lives. Taking some lessons from COVID-19, bridging the digital divide should be responsive to and inclusive of all population members in line with the Sustainable Development Agenda 2030 (Simui, 2018 and Simui et al, 2018). The digital divide is one of the factors influencing digital equity, and it is noted that the bridging of the digital divide is an enabler for students in higher education to acquire digital skills for online learning. Institutions need to take responsibility to induct their students into the use of technology to ensure its effective use. For BOU, which has a mostly adult

population, there is a need to expose students to the effective use of technology for teaching and learning. Some BOU students have always been technophobic despite having the necessary devices. Being technophobic has been evident in online assessments, especially those that are synchronous, where students failed to interact with each other and even the facilitator. It later became clear that some students had help typing their assignments from their children and even grandchildren. They did not type the assignments themselves.

Conclusion

This paper established the influence of COVID-19 on most students' learning. This influence was perpetuated by shifting from different modes such as blended learning and face-to-face to online distance learning. The literature shows that the shift presented some positive outcomes, revealing some digital equity gaps in other areas. We argue that students' access to online learning and higher education participation require technological resources and Internet connectivity. The presented pre-service teachers' queries affirm the need and importance of digital equity to access learning and participate in an online learning space. Institutions of higher learning must work on a digital equity framework consisting of an access and participation plan that will ensure that students, during their first year at the university, are equipped with digital knowledge, awareness of essential features of the digital space as well as ability to use relevant digital skills to participate in online learning spaces.

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