



Volume 21, 2022

STUDENT ACCESS TO AND COMPETENCE IN MIGRATING TO A FULLY ONLINE OPEN DISTANCE LEARNING SPACE

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ABSTRACT

Aim/Purpose	This article aimed to explore student perceptions and experiences of migrating to a fully online mode during COVID-19.
Background	The COVID-19 pandemic changed the mode of delivery from face-to-face or blended learning to fully distance learning. The introduction of the Disaster Management Act (2020) in South Africa forced all institutions of learning to close their doors and move to teaching and learning online. We, therefore, needed to investigate whether the students at an Open Distance Learning (ODL) institution had access to the necessary devices and to see how they responded to fully online learning. Subsequently, this prompted a need to investigate student access to and competence in online learning in a fully ODL space during COVID-19. Since COVID-19 is a recent occurrence, little is known about how students experienced a (forced) move to fully online learning. In South Africa specifically, much less is known about fully online learning.
Methodology	The structured web-based survey was sent to all registered Bachelor of Education and Postgraduate Certificate in Education students. The structured questionnaire asking questions about students' access to devices and their experiences of learning in a fully online mode, was administrated through Google Survey forms. There were 2,858 responses received. Descriptive statistics and exploratory factor analysis were used to uncover findings.
Contribution	This paper sets out student teachers' experiences of learning in a fully online mode during COVID-19 in a developing country such as South Africa. These

Accepting Editor Dennis Kira | Received: November 25, 2021 | Revised: February 1, March 29, April 11, April 29, May 16, 2022 | Accepted: May 19, 2022.

Cite as: Mudau, P. K., Biccard, P., Van Wyk, M. M., Kotze, C. J., & Nkuna, V. R. (2022). Student access to and competence in migrating to a fully online open distance learning space. *Journal of Information Technology Education: Research*, 21, 197-215. <https://doi.org/10.28945/4976>

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	experiences as representative of the global South, are previously unknown to scholars and can assist in designing future fully online programs in this context.
Findings	Access to affordable data is an obstacle for students to access the learning management system. Students felt that the university took a long time to distribute laptops and also indicated that they lacked a suitable and stable internet connection. The digital divide was made more apparent and significant during COVID-19 although students indicated that they did develop necessary digital competencies.
Recommendations for Practitioners	Practitioners in Open Distance Learning should understand students' context regarding access to tools and connectivity when designing courses.
Recommendations for Researchers	Researchers should explore theoretical framings to understand issues related to online education when access to tools and connectivity is limited.
Impact on Society	The digital divide was exacerbated by COVID-19. Students and communities need support to move to online modes of engagement.
Future Research	More studies of a qualitative and mixed-method nature should be conducted to fully understand student teachers' context and challenges with online learning. Further research that includes student responses using non-digital means needs to be explored.
Keywords	student teachers, distance learning; online learning survey design, exploratory factor analysis

INTRODUCTION

Since December 2019, the COVID-19 pandemic has changed the world dramatically. Worldwide, countries were forced to close their borders to stop the virus from spreading. Governments introduced protocols and regulations in their respective countries to curb the spread of the pandemic. Moreover, businesses, households, and higher education institutions have been forced to adopt new procedures in their day-to-day practices. The pandemic changed the mode of delivery from face-to-face or blended learning to online distance learning modes, and African universities were not spared. Consequently, these institutions were forced to close their lecture halls and employ various strategies to enable operations and learning to continue while employees worked from home (Koekemoer et al., 2021). The change in the mode of teaching to online learning or e-learning, and curriculum delivery, meant students required university councils and management to shift funds toward upgrading existing information and communication technology (ICT) infrastructure, rolling out devices, and supplying data bundles to staff and students working remotely.

The South African government invoked the Disaster Management Act (2002) in March 2020 (South African Government, 2020). This included lockdown measures and social distancing that closed many face-to-face institutions. The university in this study was a distance institution where students studied using mainly correspondence methods. Printed study materials, together with textbooks, were used and students had the choice of submitting handwritten assignments by posting them in assignment boxes all over the country, or they could upload their assignments on the learning management system. In the pre-COVID era, module pages were prepared on the learning management system that included digital copies of the printed study guides. Online discussions and other tools were being used by the lecturer to facilitate learning; however, students could complete their assignments and prepare for a venue-based (in person) examination by working on their own through the printed or online study material and assignments.

Even before the outbreak of COVID-19, the university was moving certain courses fully online (using the learning management system (LMS) exclusively and no postal material was sent), however, most courses still followed the correspondence mode. To support learning, the pre-COVID university had regional centers spread across the country and students visited these centers to use laptops or access the LMS or use the digital library. However, due to the Disaster Management Act and the focus on the ‘work from home’ policy, these centers were no longer able to operate. This closure was strictly enforced for the first nine weeks of lockdown and, even since then, a full return to face-to-face on-campus learning has yet not ensued at the time of writing this article.

As a result of these closures, students had to learn how to prepare typed assignments and upload them onto the LMS. Communication with lecturers was limited to emails until the telephone systems were migrated online. A further consequence of these changes was that all examinations needed to be moved to an online platform. Student registration and support services were also moved to a fully online mode. In the early stages of the pandemic when lockdown levels severely limited movement and contact, students were not able to visit the regional centers at all. However, depending on the subsequent infection rates and lockdown levels, students were able to book appointments to receive support (in terms of administrative queries) or use computers. All this took place in a country where data is expensive and digital infrastructure does not cover the whole country.

Based on these changes, it was important to establish if the students at our Open Distance Learning (ODL) institution had access to the necessary devices and how they responded to fully online learning. Understanding the abrupt move to fully online spaces is important since it will allow one to understand the impact of the pandemic while also exposing the challenges of moving to online spaces too soon or in a haphazard manner. Subsequently, this prompted a need to investigate student access to, and competence in, online learning in a fully ODL space during COVID-19. Not only would this help assess the current situation but would also inform how ready students are for fully online learning.

Online learning is a type of distance learning where technology mediates the learning process, teaching is conducted entirely on the internet, and students and teachers are not expected to be present at the same time and location (Ally, 2008). Distance education has always relied on technologies (from postal to computing) to bridge the gap between instructors and students. McBrien et al. (2009) illustrate that rapid technological developments have facilitated online learning: a network that offers the possibility to learn from anywhere, anytime, in any rhythm, by any means (Cojocariu et al., 2014). As an educational approach, online learning has transformed the delivery of education from a teacher-centered to a student-centered phenomenon, where students are more accountable for their learning (Ally, 2008; Walsh, 2021).

As an ODL institution, the pandemic had a lesser impact on the University’s mode of tuition and operations than on face-to-face institutions. However, the pandemic positively increased this university’s footprint in the online teaching and learning space. The significance of this study lies in understanding how students perceive fully online learning during a pandemic and using this information to assist in designing more student-supported courses in this context. This exploratory study may help us to respond to students’ needs when moving courses to a fully online mode. Since institutions are moving to new online spaces and online platforms, the lessons learned here may be valuable in making decisions about new online learning spaces.

The College of Education, where this study took place, is the biggest, servicing over 100,000 students, of whom 96% are studying part-time. A pre-COVID-19 study (Nsamba et al., 2021) revealed that this institution’s computer laboratories had an extremely high occupancy (96%), indicating that students were using university computers to a remarkably high degree. This indicates that students generally relied on these computer laboratories and potentially did not own a laptop, perhaps because, in the pre-Covid mode, students did not necessarily need a laptop of their own. Since Nsamba et al.’s (2021) study was pre-Covid, we wanted to know what the effect would be COVID-19 on

students' access to devices and their subsequent learning experiences. Against this background, it can be expected that some students may have challenges in accessing the fully online teaching and learning space.

This web-based survey explored students' views regarding their access to and competence in online learning in a fully ODL space during COVID-19. The survey explored:

- Which devices did student teachers have access to for online teaching and learning during the COVID-19 pandemic?
- What were student teachers' perceptions regarding their access to tools and equipment for teaching and learning during the COVID-19 pandemic?
- What were student teachers' experiences regarding access to connectivity for teaching and learning during the COVID-19 pandemic?
- How did student teachers rate their digital competencies to engage in fully online learning during the COVID-19 pandemic?

LITERATURE REVIEW

Online learning itself is underpinned by theories such as Connectivism (Siemens, 2004), Interaction theories (Moore, 1989; Garrison et al., 2003), and Community of Inquiry (Garrison et al., 2000). However, these theories assume that students have access to the teaching and learning space. When students have challenges accessing the online learning space because of equipment or connection difficulties, these theories cannot be referred to. In this case, conceptual ideas around access to the learning space are relevant. The context of this study makes the concept of the "digital divide" particularly applicable to an ODL university context. The eEurope Advisory Group (2005, p. 7) denotes the gap "between those who are empowered to substantially participate in an information and knowledge-based society and economy, and those who are not". Moreover, the digital divide refers to the 'gap' between people who have access to modern ICTs (digital age) and those who do not have access. Those who have access control the digital age and benefit economically.

Van Dijk (2017) argues that the concept of access is used in both narrower and broader senses. Physical access constitutes a narrow definition, while a broader meaning includes various forms of access such as skills and usage access. The broader meaning is more appropriate to describe and explain digital access that leads to participation and empowerment. Van Dijk (2002) identifies four types of challenges in terms of access: mental access (interest/anxiety), materials access (computers/network), skills access (digital skills), and usage access (lack of usage opportunities). Since van Dijk (2002) sees the types of access as successive, if students lack material tools to access online learning, their digital skills and usage will also be compromised, resulting in a significant learning loss. This perpetuates inequality and further entrenches the digital divide. Moreover, in the context of this study, the digital divide may be a significant result of the country's existing social and economic inequalities (StatsSA, 2020). In support, Lembani et al. (2020) confirm that the experiences of students who are based in an urban setting are very different from those in rural contexts.

The digital divide leads to more serious consequences than only unequal access. The concept of e-inclusion (eEurope Advisory Group, 2005) is about participation and empowerment in a knowledge society through access to ICTs. Participation and empowerment go further than access or availability of tools, but tools and competencies are assumed in e-inclusion. Yu et al. (2018) thus equate the digital divide with inequality. Therefore, we accept that the digital divide and e-inclusion (exclusion) have dire consequences for students studying fully online at an ODL university. Moreover, the exclusion is acute since the move to online learning occurred almost overnight due to the COVID-19 lockdown restrictions.

ACCESS TO DEVICES FOR ONLINE TEACHING AND LEARNING

Education in the 21st Century is characterized by the rapid development of technology and the Fourth Industrial Revolution (4IR). One of the most important tasks of any university is to educate and prepare students using the most contemporary, up-to-date, and innovative teaching and learning strategies and tools. Research shows a rise in the popularity and use of mobile devices (tablets, laptops, smartphones, and mobile phones are the most preferred) for mobile learning in higher education globally (Korucu & Alkan, 2011; Romero-Rodríguez et al., 2020).

Over the past few years, in Africa, mobile learning has been on the rise. Higher education staff and students have been combining e-learning with distance learning, allowing more students to participate in online teaching and learning activities from anywhere on their mobile devices to create equal access to education for all (Kaliisa & Picard, 2017). In communities that aim to use mobile devices for learning, it is vital that the intended students have access to the necessary devices.

The inclusion of technological learning devices such as laptops, tablets, smartphones, and mobile phones into the higher education space offers faculty and students an opportunity to explore up-to-date innovative teaching and learning systems from anywhere, at any time (Rakhmatov, 2021). It may offer even more avenues of learning for students. However, the rapid growth of technology came coupled with the unexpected and instantaneous jump to fully online learning for all educational institutions as a crisis response to the COVID-19 pandemic (Adedoyin & Soykan, 2020). Issues of access and equity in online learning were already flagged prior to COVID-19 (Ives, 2021). With the advent of large-scale online learning due to the pandemic, these issues are now foregrounded. Ives (2021) recommended further studies on access and quality of online learning during the pandemic while Barrot et al. (2021) called for studies to explore a more nuanced understanding of student experiences during COVID-19. This study attempts to respond to the call for this significant area of research to be addressed by providing a perspective from a developing country

Higher education enrolment in developing countries is substantially lower than in developed countries (Kaliisa & Picard, 2017). The 'digital divide' within higher education institutions in South Africa has therefore been further emphasized by the precipitous change to fully online learning (du Preez & le Grange, 2020; Lembani et al., 2020). Parker et al. (2021) revealed students are facing dire challenges in terms of access to reliable internet connectivity and learning devices (laptops, tablets, smartphones, and mobile phones). In many cases, households share only one mobile learning device that is often outdated in terms of modern online teaching and learning requirements (Parker et al., 2021). In addition to this, South Africa has one of the highest mobile service (voice calls and data) costs globally (Moyo & Munoriyarwa, 2021). This places a serious burden on higher education students in South Africa to ensure they can optimally participate in fully online teaching and learning during the COVID-19 pandemic. A lack of technological mobile learning devices, infrastructure, and high data costs remain a challenge for disadvantaged students studying at higher education institutions in South Africa (van den Berg, 2021).

In an attempt to address the digital divide among its students, the university advised students on the specifications needed for devices and connectivity to optimally participate in online teaching and learning. The university also provided 30GB (10GB daytime and 20GB nighttime) data to all registered students during the October to December 2020 exam period. However, some of these students did not have the necessary up-to-date learning devices to use the data and take part in fully online teaching and learning during the COVID-19 pandemic. In other cases, students live in areas where connectivity to the internet is unavailable. Students who qualify for financial aid through the National Student Financial Aid Scheme (NSFAS) were compelled to include a laptop in their allocation. Despite these initiatives, limited access to learning devices remained a challenge for many students during the pandemic.

DIGITAL COMPETENCIES FOR ACCESS ONLINE LEARNING

Online teaching and learning require that students and teachers have digital skills to be successful. To participate actively in online learning, Martin et al. (2020) propose the following four competencies: online attributes, time management, and technical and communication competencies. Without these digital skills and accompanying devices (laptops, tablets, desktops, and smartphones), students cannot access online learning platforms to engage meaningfully and achieve the aims of the course. Conversely, without taking part in online learning, students may not have the opportunity to develop their digital skills. Based on the latter, the European Communities (2007) identifies digital competence as one of the eight most important competencies students need to thrive in the 21st century. According to Ferrari (2012, p. 3), digital competence is a “set of knowledge, skills, attitudes that are required when using ICT and digital media to perform tasks”.

Studies conducted in developed countries reported that, although students may have technological gadgets and data to access online learning, they do not have the skills to use these gadgets meaningfully (Brotman, 2016). In some cases, students may have skills to use mobile devices, but not for effective learning in an online environment. This view is supported by Küsel et al. (2020), who reported that most university students were not ready for fully online learning. Roddy et al. (2017) indicated that when students were studying fully online, they required more support.

Prior to the COVID-19 pandemic, universities followed different modes of curriculum delivery, but since 2020, fully online courses have been the norm. This has forced students to use devices for fully online learning. For students to be ready for online learning, they need to have online attributes to self-regulate and manage their learning in an online space. These attributes, such as self-efficacy and time management, are vital for success in an online environment (Martin et al., 2020). Moreover, technical competencies give students access to digital tools and technical knowledge of how to use them properly and effectively in an online learning space. Students and lecturers also communicate, collaborate, socialize and share content in an online community (Brotman, 2016; Martin et al., 2020).

Various studies have examined contextual factors that affect the digital competence of students, and variables such as age and gender are most common (Cabezas-González et al., 2021; Hämäläinen et al., 2021). Furthermore, the issue of gender seems to be complex; as reported by Hatlevik and Hatlevik (2018), there is no significant difference between gender and digital competencies.

ACCESS TO CONNECTIVITY

Lack of access to connectivity creates learning disadvantages for students. This disadvantage is inconvenient and leads to challenges in students successfully meeting course outcomes (Robinson et al., 2018). Even if universities provide data for their students, the data is meaningless if their geographical infrastructure cannot support the connectivity. A study based on rural US schools found that students who did not have home internet or relied on their phones for connectivity achieved lower results than their counterparts (Hampton et al., 2020). Unreliable connectivity or ad-hoc connectivity perpetuates learning inequalities. In a study by Barrot et al. (2021), Filipino students’ greatest challenge during COVID-19 was that their home environments were not conducive to learning. Additionally, Noori (2021) argues that students have not experienced constant and effective online learning and teaching during the COVID-19 pandemic because they were facing a lack of sufficient facilities and resources.

According to Munezero et al. (2016), infrastructure (access to computers, the internet, and stable electricity supply) was the most critical factor in online learning in Kenya. South Africa shares some of Kenya’s challenges. For instance, electricity supply can be inconsistent, with days or weeks of load-shedding (switching off electricity supply to areas on a rotational basis when the required amount of electricity cannot be supplied by the national electrical supplier) occurring, while students do not all have access to computers or laptops. Internet connectivity is also sparse in rural areas, and data costs are some of the highest in the world (Moyo & Munoriyarwa, 2021). Furthermore,

COVID-19 brought about restrictions on people's movements (Barrot et al., 2021) and this exacerbates connectivity problems. Based on these sentiments, the digital divide is a major factor in connectivity across all spaces of South Africa.

Moreover, students' financial context plays a determining role in their access to devices, connections, and affordability of data (Parker et al., 2021). For example, American students whose annual household income was less than \$50 000 had issues with connectivity and accessing course material due to unreliable and costly data (Parker et al., 2021). In a South African context where the Gini coefficient is at 63,0%, the divide between students who have and those who do not have access to connectivity is emphasized (Mtapuri & Tinarwo, 2021). In Barrot et al.'s (2021) study, students came from low socioeconomic backgrounds and the financial struggles impacted their ability to access resources for their learning. As with Barrot et al.'s (2021) study, our findings cannot be generalized to higher-income countries. This study brings a perspective from lower-income countries that were forced to move all learning fully online while not having the mental, materials, skills, or usage access in place.

METHODOLOGY

An online structured questionnaire was used to collect data. The survey was sent to all registered Bachelor of Education (BEd) and Postgraduate Certificate in Education (PGCE) students. A sampling strategy was not employed since we were aware of the potential for low response rates therefore to maximize the response rate we sampled the whole population. A total of 43,331 students received the survey, and 2,858 responses were received, reflecting a 6.6% response rate; slightly higher than the average survey response rate. With the assistance of SPSS version 25, data were analyzed statistically and reported through descriptive and inferential statistics. The calculated data were presented and analyzed in the form of descriptive statistics, cross-tabulations, and figures.

The instrument took the form of Likert items in various scales. We asked students which devices they were using, how they were managing with the LMS, and their quality of internet connectivity and availability of data bundles. A five-point Likert Scale was used for the questions on using the LMS and internet access. After producing descriptive statistics (cross-tabulations and figures), the second step in generating inferential statistics was to use the PCA statistical tool to reduce the data and extract factor loadings. These computed factors were turned for better interpretation and to create a simple factor analysis with high loads on each factor. When identified factors are interpreted, the factor load in each factor is key related to the strength of the relationship. Two factors (online access and digital competencies) were identified.

All ethical issues, such as research permission, ethical clearance, and informed consent were adhered to in the study. Prior to conducting this research, we applied for ethics approval from the university's ethics committee (Reference number : 2020/08/12/90159772/19/AM). In accordance with stipulated university policy, confidentiality and COVID-19 protocols were observed and adhered to before, during, and after data collection applicable to COVID-19 lockdown levels. Limitations of our study include the fact that the survey was online, and may have excluded students who do not have regular online access, similar to the limitations set out by Froman et al. (2020). The implications of this are that data may be skewed towards responses that indicate higher levels of competency and access.

RESULTS

SOCIODEMOGRAPHIC INFORMATION

The cross-sectional web-based survey was sent to students via their university emails, and 2,858 completed responses were received. Respondents' biographical data are based on the survey, which focused on gender, age cohorts, and registered year of study (Table 1).

Table 1. Frequency and percentage of sociodemographic data (N=2858)

Variables	Categories	Frequency/count	%
Gender	Male	457	16
	Female	2401	84
Age	18-23 years	1000	35
	24-38 years	1743	61
	39-54 years	115	4
Qualifications	1 st Year BEd	1400	49
	2 nd Year BEd	857	30
	3 rd Year BEd	429	15
	4 th Year BEd	114	4
	PGCE	58	2

Based on the data collected from the respondents, male students comprised 16% and female students were 84%. According to the age group of the respondents, 35% of respondents were in the 18-23 years category, 61% in the 24-38 years, and 4% in the category of 39-54 years. Most (96%) respondents who participated in the study were under the age of 38. The majority between the ages of 24 and 38 represent millennials. Given that 84% of the respondents were female, this is in keeping with the registration data (69% female registered across the whole university). We now turn to our first research question:

RQ1: Which devices did student teachers (B.Ed and PGCE) have access to during online teaching and learning during the COVID-19 pandemic?

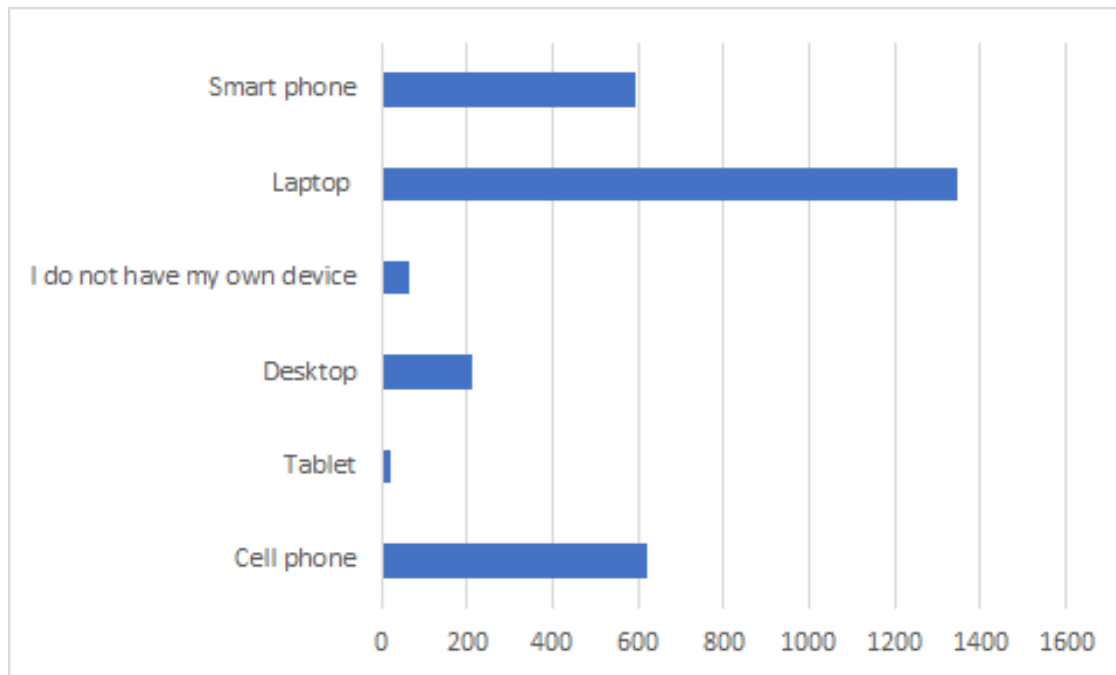


Figure 1. Devices used for access to online learning

Laptops (47%) were the most used devices for access to online learning during COVID-19, based on the information presented in Figure 1. Access remains a challenge for students who have cell phones (22%) that are not internet-enabled. As a result, the high rate of laptop use (47%, $n=1,344$) is probably driven by the national bursary scheme where laptops were provided to students. We also made a distinction between cell phones and smartphones with smartphones being internet enabled. Tablets are the least used device, a finding similar to Pete and Soko (2020) for sub-Saharan Africa. Correa et al. (2020) indicated that the use of phones for learning can be associated with lowered skills since computers are associated with a greater level of digital skills.

ACCESS TO TOOLS AND EQUIPMENT (MATERIALS ACCESS)

RQ2: What were students teachers' perceptions regarding their access to tools and equipment for teaching and learning during the COVID-19 pandemic?

Most respondents indicated they had suitable tools and equipment for online teaching and learning (Table 2).

Table 2. Access to tools and equipment

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean Scores	St. Dev
Q2.1 I lacked suitable tools (laptop/desktop) of study online (IT equipment)	524 18.3%	739 25.9%	508 17.8%	538 18.8%	549 19.2%	2.95	1.395
Q2.2 I had outdated equipment (laptop/desktop) that impacted my learning	513 17.9%	869 30.4%	531 18.6%	595 20.8%	350 12.2%	2.79	1.295
Q2.3 Student laptops from the university took a long time to be distributed	313 11.0%	271 9.5%	942 33.0%	470 16.4%	862 30.2%	3.45	1.303

Notes: Response ($n=2858$), ($\alpha < .779$ for three items)

While there were slightly more students who felt they had a suitable device to study online (44%, $n=1,263$), there were still 1,087 students (38%) who did not have a suitable device and 508 students (18%) who indicated a neutral response to the question of suitability. This, therefore, highlighted that a sizeable number of students (38%) were not equipped for fully online learning, while almost 20% of students could not judge the suitability of their devices. It may point to students not knowing what devices were necessary for online learning since the move to online learning spaces was sudden. Only half of those surveyed felt that the university took a long time to deliver and distribute laptops to them ($M = 3.45$; $SD = 1.303$).

LEARNING MANAGEMENT SYSTEMS (LMS) (USAGE ACCESS)

The respondents were asked to respond to questions focusing on their access to the learning space and their competencies to access and use the LMS (Table 3). Since all learning and communication moved to the LMS, it is important to ascertain if students were able to connect to this space.

Table 3. Access to LMS

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean Scores	St. Dev
Q2.6 I lacked access to the LMS and my module sites	721 25.2%	975 34.1%	593 20.7%	353 12.4%	216 7.6%	2.85	1.315
Q2.10 Inconsistent operation of the LMS	467 16.3%	851 29.8%	785 27.5%	458 16.0%	297 10.4%	2.62	1.285
Q2.11 I experienced challenges with the assignment submission system	627 21.9%	925 32.4%	526 18.4%	473 16.6%	307 10.7%	3.11	1.258

Note: Response (n=2858)

To the question on access to the module sites, students responded positively (59.3%) that they could access the LMS and the module sites (M = 2.85; SD = 1.315). In conclusion, the results revealed that respondents had access to the learning space (LMS) to upload assignments and performed online learning tasks. These results should, however, be interpreted against the low response rate and an assumption that students who did take part in the survey had better digital skills as the survey was delivered online. Therefore, it can be assumed that students without access or limited skills may not have completed this survey.

ACCESS TO CONNECTIVITY (MATERIALS ACCESS)

The information in Table 4 reflects that most (66.3%) respondents agreed they had insufficient data bundles to work remotely and learn effectively during COVID-19 (M = 3.78; SD = 1.416). Respondents (53.4%) also indicated that they lacked a stable and suitable internet connection to learn online (M = 2.43; SD = 1.204).

Table 4. Access to internet connectivity

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean Scores	St. Dev
Q2.4 I had insufficient data bundles to work remotely and learn effectively	344 12.0%	282 9.9%	337 11.8%	589 20.6%	1306 45.7%	3.78	1.416
Q2.5 I lacked a stable and suitable internet connectivity	335 11.7%	485 17.0%	514 18.0%	685 24.0%	839 29.4%	2.43	1.204

Note: Response (n=2858)

DIGITAL COMPETENCIES (SKILLS ACCESS)

RQ4: How did student teachers rate their digital competencies to engage in fully online learning during the COVID-19 pandemic?

The information in Table 5 reflects that most (45.1%) students felt that they were digitally competent to participate in online teaching and learning activities (M = 2.40; SD = 1.140). More notably, one-third (33% or 948 students) indicated that they lacked digital competencies. For the question on

digital competencies to use the LMS, most respondents (61%) indicated that they had competencies to use the LMS ($M = 2.34$; $SD = 1.178$). The LMS system is known to the students, while the newer tools used during this time (e.g. Microsoft Teams or the examination platform) were not known to students resulting in the difference in responses between their competencies in using the LMS and their general competencies for online learning. Usage access affects digital competencies. Students may be comfortable with the LMS since they have used it in pre-COVID learning.

Table 5. Digital competencies to engage in online teaching and learning

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean Scores	St. Dev
Q2.7 I lacked digital competencies to participate in online teaching and learning activities	498 17.4%	791 27.7%	621 21.7%	524 18.3%	424 14.8%	2.40	1.140
Q2.8 I lacked competencies to use the LMS	654 22.9%	1088 38.1%	602 21.1%	342 12.0%	172 6.0%	2.34	1.178
Q2.9 I lacked competencies to upload assignments	747 26.1%	1091 38.2%	512 17.9%	306 10.7%	202 7.1%	2.74	1.209

Notes: ($\alpha < .861$ for three items), Response ($n=2858$)

Based on the information in Table 6, the first factor was identified as *online access* and loaded six items. These six items have a strong relationship. Only the item “I lacked digital competencies to participate in online teaching and learning activities” was loaded on factors 1 and 2. The second factor, LMS competence, loaded six items and tended to reflect a strong relationship.

Table 6. Factor loadings for online access and LMS competence

Question items on access and competence for online teaching and learning	Factor	
	F1: Online access	F2: LMS competence
Q2.9 I lacked competencies to upload assignments	.831	
Q2.8 I lacked competencies to use myUnisa	.772	
Q2.10 Inconsistent operation of the myUnisa system	.662	
Q2.6 I lacked access to myUnisa and my module sites	.660	
Q2.11 I experienced challenges with the assignment submission system	.654	
Q2.7 I lacked digital competencies to participate in online teaching and learning activities	.516	.357
Q2.4 I had insufficient data bundles to work remotely and learn effectively		.702
Q2.1 I lacked suitable tools (laptop/desktop) of study online (IT equipment)		.616
Q2.5 I lacked a stable and suitable internet connectivity		.604
Q2.2 I had outdated equipment (laptop/desktop) that impacted my learning		.558
Q2.3 Student laptops from Unisa took a long time to be distributed		.554

Note: Extraction method: principal axis factoring; rotation method: varimax with Kaiser's normalization

DISCUSSION OF FINDINGS

The first research question was formulated to explore which devices students used to access online learning during the COVID-19 pandemic. Findings reflected laptops were the most used device (47%) for access to online learning. A substantial number of respondents (78%) had access to suitable internet-enabled learning devices (laptops, smartphones, tablets, and desktop computers) during the COVID-19 pandemic. However, despite the wide range of options, it can be considered that computers are more useful than smartphones (Correa et al., 2020) or tablets since they allow for more interactivity through keyboard and mouse. Smartphone usage is the least effective, not only because of screen size but also due to using diminutive touch screen keyboards to type. Previous studies reported an increase in the use of mobile devices, such as tablets, laptops, smartphones, and mobile phones for online learning globally (Korucu & Alkan, 2011; Romero-Rodríguez et al., 2020). However, van den Berg (2021) opines that a lack of mobile learning devices, infrastructure, and high data costs remain a challenge for disadvantaged students studying at higher education institutions in South Africa. Moyo and Munoriyarwa (2021) reported that South Africa has one of the highest mobile and data costs globally. Moreover, Adedoyin and Soykan (2020) emphasize that the rapid growth of technology became evident as educational institutions adapted to online learning in response to the COVID-19 pandemic. However, access to online learning during COVID-19 can provide a glimpse into the preparedness of Southern Africa (Pete & Soko, 2020) for fully online learning since it was only a reality during this time when universities were forced to make changes based on health measures.

The second research question was posed to determine respondents' perceptions of their access to teaching and learning tools and equipment during the COVID-19 pandemic. Most of the respondents (44.2%) agreed ($M = 2.95$; $SD = 1.395$) that they had a suitable device (laptop/desktop) to study online, while 38% (almost 2 out of every 5 students) did not have suitable devices for online learning. Moreover, respondents agreed (48%) that they had outdated equipment. Parker et al. (2021) concur and reported that many South African households share one device that is often outdated. The exact specification of what constitutes a 'suitable device' was also not specified, so respondents may not have been able to judge their devices when the survey was distributed. The implications are that without a common understanding of what makes a device 'suitable' will have impacted the responses. Institutions should advise students regarding minimum requirements for devices. At the institution, laptops were provided to students who did not have adequate access. However nearly half of those who responded (46.6%) felt that the university took a long time to deliver and distribute these laptops to them ($M = 3.45$; $SD = 1.303$). This would have impacted their studies negatively. Devices should form part of the package given to all students (not only bursary students). This can take the form of vouchers (that include specifications) that students can use at various stores. Almost 46.6% of students noted the late distribution of laptops. It is likely that these students relied on university initiatives to provide laptops. Furthermore, it is also likely that these students cannot afford to buy their own devices, highlighting the digital divide in South African society. Granted, the closure of all campuses and regional centers was an unusual circumstance of the pandemic, and with regional centers operating as usual, students may have more access to devices they need in post-pandemic times. The information in Table 3 reflected that most (66.3%) respondents agreed they had insufficient data bundles to work remotely and learn effectively during COVID-19 ($M = 3.78$; $SD = 1.416$). This shows that students struggled with connectivity, which would have affected their ability to learn effectively. Without adequate data access for online learning, learning results are compromised (Robinson et al., 2018). Although some respondents indicated they had access to data, Lembani et al. (2020) remind us of the South African context where the digital divide is evident in urban vs rural students' access and success in online learning. The digital divide can worsen inequalities (Hussain, 2020) in learning opportunities and learning outcomes.

For the third research question, which asked what students' experiences regarding access to connectivity for teaching were and learning during the COVID-19 pandemic, respondents (53,4%) indicated

that they lacked a stable and suitable internet connection to learn online ($M = 2.43$; $SD = 1.204$). In terms of the digital divide, materials access also relates to internet connectivity (van Dijk, 2002). Not only does an internet connection allow students to enter the teaching and learning space, but not being able to connect to the internet. The lack of internet access means that students do not have access to the world's largest knowledge repository (Braga et al., 2020) and largest communication enabler. As far back as 2005, Muilenburg and Berge (2005) identified that cost and access to the internet are barriers to online learning, as did the National Center for Educational Statistics 2008 study (Sun & Chen, 2016). During pandemic online instruction, poor access to the internet goes beyond a matter of inconvenience to one that may be considered a basic need, along with water and electricity. If students do not have access to the internet, online learning cannot take place.

For research question 4, the information in Table 5 reflected that only 45.1% of respondents felt they were digitally competent to participate in online learning activities ($M = 2.40$; $SD = 1.140$). It is worth noting that, although the university provided students with laptops and data, many students felt they could not participate meaningfully in the online learning space due to their lack of digital skills. This is a clear indication that without digital competencies, as proposed by Martin et al. (2020), the majority of the students will not engage fully in the online learning space. We also understand that usage access does not necessarily follow skills access, but that there is a co-dependence on skills and usage. In this sense, we disagree with van Dijk (2002, 2017). We remain sensitive to the fact that online learning during the earlier COVID-19 months was an emergency measure (Hodges et al., 2020) and not necessarily thoughtfully planned. The results could be quite different when courses, assessments, and communication are planned as fully online from the design phase. We also need to note that participation in online teaching and learning activities is also dependent on their explicit planning and presentation as online courses and not an emergency measure. Current studies reveal that instructors and lecturers themselves experienced challenges with planning, conducting, and facilitating fully online learning during the pandemic (Na & Jung, 2021).

Conversely, for item 8, respondents (61%) indicated that they had competencies to use the LMS ($M = 2.34$; $SD = 1.178$). Finally, respondents (64.3%) also felt that they had the competencies to upload assignments. The findings of this study ultimately show that students were competent in using the university's LMS and were able to upload their formative assignments. These LMS competencies may have already been entrenched in students since the university is an ODL institution and uploading assignments had been an option for a number of years. It appears that where students were already using LMS tools, this facilitated their preparation for fully online learning. Migrating to fully online learning spaces can be supported through using tools incrementally.

CONCLUSION

The purpose of this article was to explore student experiences and perceptions of fully online learning. Prior to COVID-19, students could participate in blended learning where they had a choice of online or hardcopy assignment submission or online or hardcopy study material. An online survey was sent to all students registered for the BEd and PGCE courses. This study was designed to determine students' views of access to and competence in online learning in a fully Open Distance e-Learning space during COVID-19. To achieve this aim, exploratory factor analysis was computed from the survey design to extract two factors, namely online access, and LMS competence. The findings revealed that only 55% of respondents had access to a tablet, laptop, or desktop for online learning. These results are in stark contrast to Froman et al.'s (2020) study in the US, with 73,4% of students having access to these devices. Government, corporate and university initiatives need to accelerate the rollout of a laptop for each student and free data, which much be included in each student's registration package. Furthermore, we recommend free data for all to improve usage access across all digital devices and platforms in communities in South Africa. The wider the usage of the internet in a community, the easier it will be for all to use technology for various aspects of their lives (e.g., banking, learning, etc.). We view this, as did Moore and Kearsley (2012), as a matter of equity. A

result of 55% for students who have tablets, laptops, and desktops may be acceptable, but students who responded to this survey were most likely those who have a device.

Without easy access to the regional centers, students relied mostly on the institution to provide laptops and the slow rollout was noted. Without the tools to facilitate their learning, students would be disadvantaged in a fully online learning environment. However, students noted that they were able to use the LMS without too many obstacles, indicating their level of skills and usage access. This may be a result of the institution using the same LMS for a number of years, or that the LMS is compatible with cell phones. It is advisable that institutions ensure that their LMS systems are compatible across different devices. Materials access was further compounded by students not having suitable internet connections or data bundles to allow them to access the LMS.

The results of this exploratory study have shown that access to devices and competence in online learning post-COVID-19 pandemic is vital for sustainable and quality education for all students. Van Dijk's (2017) broader exposition of the digital divide relates to the four research questions. Although their materials access appears sufficient, it is not ideal for a fully online option to learning connectivity was a far greater challenge for students in this study. In terms of opportunity or usage access, connectivity to the learning management system creates a challenge for students who are suddenly expected to shift their learning activities online. LMS competence and experience in knowing what to do on the LMS can mediate the sudden shift to fully online learning. The use of an LMS should be a common feature of online learning.

A limitation of this study includes only one college in the university was sampled and that the questionnaire was conducted fully online. Students who do not have regular online access may have missed the opportunity to take part. Students with lower digital competencies will fall behind in online learning (Adedoyin & Soykan, 2020). Further research with various groups of students in various contexts is needed to fully understand migration to online learning.

Although online learning has saved education (for some) during the pandemic, the digital divide is still evident. Many students, especially in developing countries, had difficulties across the access spectrum (Mustafa, 2020). We should, however, consider the opportunity to increase access to digital technology as a priority emanating from the pandemic. Consideration should also be given to using "older" technologies such as television and radio, since the infrastructure for these may have more reach, while wider-reaching digital systems are being developed (Tadesse & Muluye, 2020). What is apparent, is that through the crises brought about by the pandemic, universities may have been unprepared for fully online learning; however, the progress made during the past two years is noteworthy.

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