

Digital Learning: Challenges experienced by South African university students' during the COVID-19 pandemic¹

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ABSTRACT

The novel coronavirus pandemic continues to wreak havoc globally, and lockdowns added to the disruption. In South Africa, higher education was thrust into online learning almost instantly. Before the lockdown, online learning was not taken very seriously, and the rollout was delayed. Many higher learning institutions scrambled to switch over to online teaching and learning, and this move highlighted the disparities and profound inequalities among students, which have further exacerbated the digital divide. Students in the urban areas seemed to be better off than their counterparts who live in rural areas. Students living in rural areas struggle without having proper digital devices and poor internet connectivity. Now that the COVID-19 restrictions are removed, it is vital to reflect upon the lessons learnt; therefore, this paper focused on the challenges experienced and how higher education can be transformed digitally by ensuring that all its students can benefit. The paper adopted a quantitative research approach with 125 undergraduate students participating. The paper was conceptualised using the Technological Acceptance Model and the Social Constructivism Theory. The findings reveal that students are not satisfied with the current state of online learning and the key challenges confirmed the lack of digital resources, internet connectivity, availability of electricity, and high data costs. It is recommended that higher education develop strategic plans coupled with digital literacy and resources to equip both students and academics to address the digital gap.

Keywords: COVID-19 pandemic, digital divide, digital transformation, higher education, online learning

INTRODUCTION

Over the past two years, we have witnessed how the coronavirus pandemic has profoundly changed the lives of many across the world. UNESCO (2020) provides an estimate that 1.6 billion learners constituting 72.4% of total enrolled learners across 177 countries were impacted because of the temporary closure of educational institutions to contain the spread of COVID-19. Some countries opted for no lockdowns (Sweden); others a complete lockdown (South Africa, India) to contain the impact of this contagious disease/slow the spread of COVID-19. This abrupt disruption caused the normal functioning of educational

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systems across the globe to close their campuses and abandon face-to-face teaching. Many had to seek alternative measures to sustain their academic programmes.

The World Bank noted that higher education institutions understand the educational, logistical, and also high-tech challenges to these timely measures. Most of the higher educational institutions in low-and middle-income countries, including students and academics, lack access to high-speed broadband or digital devices needed to arrange online learning options fully. Thus, a shift from contact teaching to emergency online learning opened the cavernous digital divides between and within schools and countries, particularly among low-medium income countries like South Africa (World Bank, 2020). In South Africa, there is an acute digital divide in which the coronavirus pandemic is once again exposed (Du Preez & Le Grange, 2020). The digital divide refers to the gap between people who can access different types of information and communication technology (ICTs) and those who are unable to have access to it (Pather, Booï & Pather, 2020).

Mlaba (2021) notes that South Africa was given by the World Bank in 2019 the title of being the most unequal country economically and socially. Another disparity is digital inequality. Digital access and literacy continue to increase s inequality gap in South Africa. Jantjies (2020) also reflects on the reality of South Africans, the varying digital skills of teachers and students plunged into the COVID-19 lockdown. With schools and universities switching to online learning, this further placed students at a disadvantage since the affordability of data limits their online learning activity. Moreover, the COVID-19 pandemic has revealed that having and using technology can no longer be regarded as a luxury but as essential to a person's education.

THE PROBLEM STATEMENT

As noted above, South Africa is regarded as the most unequal country in the world (Friedman, 2020). The digital divide further disadvantages most people, especially students and academics. Lockdown forced academics and students to navigate through online learning even though the required skills are lacking. While both students and academics realise that this is a 'do or die situation and attempt to embrace this approach, their success is limited since they lack the tools and knowledge on how to.

Jantjies, (2020) avers that South Africa's digital divide is driven by broken down into three factors,

access to hardware, understanding digital means of communication, and internet affordability. These factors are harming two of the country's best chances at development and equality, those being access to education and access to employment opportunities.

Naidoo and Israel 2021 add that learning becomes challenging due to not having a digital device, the lack of internet connectivity and the high cost of data.

Joshi (2021) believes that the opportunity offered by COVID-19 can be used by the education officials and policymakers in South Africa to introduce new learning modes like online learning to make their education systems more resilient. This can enable them to cope with current disruptions, recover from them, and prepare for future emergencies. However, we cannot turn a blind eye to the various challenges faced by students to transition to online learning. According to Aguilera-Hermida (2020), it is important to take into account students' challenges and their preferences; these will assist in forming strategies that will help should some other such waves or disasters can occur in the future.

These issues need to be addressed so that no student is left behind amid the COVID-19 pandemic. This research was conducted at the University of Zululand, a rural-based university in South Africa with many of its students coming from rural communities. Therefore, the research seeks to answer the following question:

What are the challenges faced by students at the University of Zululand in transitioning to online learning during the COVID-19 pandemic?

The objectives of the study are:

- To evaluate the challenges faced by students in transitioning to online learning during the coronavirus pandemic
- To provide strategies aimed at curbing these barriers to online learning during the pandemic.

LITERATURE REVIEW

The digital divide

Pather et al. (2020) stress that over several years we have witnessed a sense of urgency with which governments have attempted to tackle the digital divide. However, the COVID-19 pandemic resulted in a situation where lecturers who are accustomed to on-campus contact teaching had to migrate to the emergence of online teaching hastily. Dhawan (2020:7) indicates that online learning is defined as learning experiences in synchronous or asynchronous environments using different devices with internet access, where students can be anywhere (independent) to learn and interact with instructors and other students. With the help of online teaching modes, we can reach many students at any time and in any part of the world.

Within the turmoil of the pandemic, academics are left trying to navigate the online landscape, which for some is new turf, trying to find the best option that will suit the needs of students and getting all students onboard has been challenging within the digital divide that exists in South Africa. Higher education institutions are becoming gradually aware of the diversity of their learners. COVID-19 pandemic has become a promoter of digital pedagogy, and it is a concept that has increased in momentum within educational circles. This allows education to advance in this technological world. To fully realise this benefit, educators must be adequately equipped with proper training (Naidoo & Naidoo, 2021). Orlando and Attard (2015) indicate that teaching with technology is not a one size fits all approach as it rests on the types of technology in use at the time and also the curriculum content being taught. In these trying times, the concern is not about whether online teaching-learning methods can provide quality education; it is rather about how academic institutions will be able to adopt online learning in such an immense manner (Carey, 2020).

The digital divide has impacted higher education over the years, and not much was done to address this gap. These inequalities have been stacking up long before South Africa became free from apartheid. According to Pather et al. (2020), in the post-apartheid era, we have witnessed a massification in the higher education system, which has compelled all universities to improve the provisioning of on-site learning resources. Educational institutions faced many challenges with infrastructure, financial shortages, and huge student debt. Pather et al. (2020) further state that due to the inequality in the socio-economic status of many students, they lack access to resources, and some rely on the use of computers and free Wi-Fi on campus, as they lack these tools at home. It is important to understand that the disparities vary in communities; while some homes may connect online with great expense, a larger group - the low-income students - find it difficult to migrate to online learning. They are unable to access these digital tools and end up falling behind or dropping out.

Lockdown disconnects face-to-face teaching and learning and forces face-to-screen virtual learning and does not take into account these existing challenges (Dlamini & Naidoo, 2022). Dlamini and Ndizininia (2020) agree and note that ICTs at universities have essentially altered teaching and learning from lecturers having much personal contact with students to a socially oriented activity. However, this switch was not

a silver bullet; the lack of skills, connectivity, load shedding, lack of digital devices, and no or expensive data costs was not considered. Nevertheless, academics and students have been trying to connect through apps as well as learning management systems such as Moodle. Colleges and universities, in addition to using these modes of communication, are holding webinars and video conferences to ensure that learning goes on Joshi (2021).

Challenges of digital transformation

Exponential advances in ICTs have forced traditional universities to consider changes in education delivery models. They have had to invest heavily in digital technologies to embrace online learning and adapt to the changing landscape (Dlamini & Ndizinisa, 2020).

StatsSA (2016) reported that only 9.5% of the South African population have internet access at home. Joshi (2021) acknowledges that, as noted above, during COVID-19, emphasis on greater uses of online learning and lack of affordability of devices and inaccessibility of internet connectivity appears to be discriminatory and distortional in terms of expanding inequity and likely to widen existing disparities and have serious adverse implications for the South Africa economy and society.

However, it was imperative to save the academic year to avoid further widening inequalities for vulnerable and disadvantaged students. This meant universities had to transfer their teaching and learning activities to digital online platforms. As universities began to upgrade LMS,

the reality that many students reside in rural areas where connectivity is a problem began to surface as part of discussions between Students Representative Councils and universities' Senior Executive Teams' (Dlamini & Ndizinisa, 2020: 60).

Despite the increased access to information and communication technologies, South Africa still trails behind the other BRICS (Brazil, Russia, India, China and South Africa countries).

Dlamini and Ndizinisa (2020) postulate that South Africa has yet to recognise its educational capacity. Many academics have not been adequately equipped to transition to online learning and do not have the necessary technological skills, further to that, the South African landscape is still demarcated by areas with no or poor connectivity and unstable electricity and the technical abilities of most students (Dlamini & Ndizinisa, 2020). Dengarian (2020) argues that a radical rethinking of education is needed, and the COVID-19 crisis is accelerating the debate around non-classroom teaching methods, novel methods of examinations, and education overall. Kopp, Gröblinger and Adams (2019) indicate that digital transformation is not a new phenomenon, and it has been accompanying higher education institutions for some years now. The digital divide encompasses challenges that include the lack of infrastructure and limited digital literacy within low- and middle-income groups. Joshi (2021: 55) insists that if implemented properly, it can help in checking the 'digital divide' and reaping 'digital dividends'. Going digital is the way forward for the education sector. Orlando and Attard (2015) stress that together with the increasing digitalisation of many workplaces, new types of learners' surface, who may be more digitally competent than previous generations due to their 'digital native' status.

Pather et al. (2020) maintain that one of the primary challenges that exist in South African universities' plight to transform the programme delivery is that of the resource readiness of the average South African university student. The task is to ameliorate social structures that could deepen disparities and limit access to higher education (Dlamini 2018). Habib (2016: 36) points out that instead of rationalising education, the profound challenges must be understood so that universities are 'reactive to the goals of equity, efficiency, democratic participation, and development'.

Kopp et al. (2019) point out five common assumptions that are considered more hindrances to the digital transformation of higher education institutions as against contributions to its realisation, and these assumptions are related to (i) change, (ii) pace, (iii) technology, (iv) competencies, and (v) financing. Students can feel a sense of anxiety and be out of their comfort zone despite the best intentions of academics. Long-term online learners can feel in an isolated place where they may also have varying levels of competency and proficiency using different forms of IT and are therefore somewhat on their own when it comes to the online learning environment through different learning management systems (LMS).

Aboagye et al. (2020) suggest that students were not ready to adapt and lack of motivation during online learning. Pather et al. (2020) declare that given the fundamental role of both devices and access to broadband internet for university student success, it stands to reason that the student without access to these tools of the digital age would be at risk of failure.

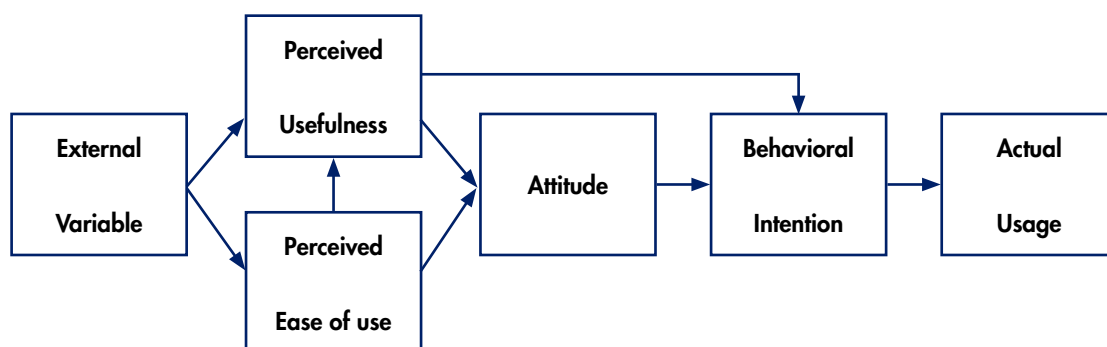
Conceptual Framework

The Technological Acceptance Model (TAM) and Social Constructivism Theory provide a conceptual view for this study. These two models are most suitable for amplifying the challenges of digital transformation and exploring a framework for digital compliance that could assist with the transition to online learning at universities in South Africa.

The Technological Acceptance Model (TAM)

Davis et al. (1989) use the Technological Acceptance Model (TAM) to provide a graphical perspective of behaviour that deals with one who chooses to engage with technology. This paper unpacks the challenges of online learning, which depend greatly on the use of technology. TAM offers an understanding of how people respond to technology usage. The model proposes the following primary factors: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). These concepts influence the overall attitude of the user. Perceived Usefulness refers to the belief that technology enhances job performance. This means that attitude towards online usage, whether positive or negative, is shaped by how students perceive the usefulness of technology in teaching and learning. While PEOU highlights the notion that effort will not be required and thus will directly affect the students' attitudes.

Figure 1:
Technology Acceptance Model



Adapted from Davis et al. (1989)

The TAM concepts are discussed with relevance to this study:

- **External variable:** within the higher education landscape, the coronavirus pandemic is the external variable that resulted in the overnight transition to online learning due to the lockdown in South Africa.

Lockdown was aimed at reducing the spread of the virus and reducing the number of fatalities. The external variable (COVID-19) impacts the concepts of perceived usefulness and perceived ease of use. However, there are various disparities among students that leave them challenged with embracing online learning.

- **Perceived Usefulness:** the transition to online learning from the traditional setting has not been easy for students and academics. There are digital tools that are required for online learning, such as access to a stable internet connection and devices. Students may agree to online learning as an alternative to enhance learning during these circumstances, however, they lack the tools to achieve this. Hence the university began distributing laptops to qualifying students and implemented zero-rated data required to access Moodle (LMS).
- **Perceived Ease of Use:** while making the transition and having access to devices. Many academics and students still lack the basic digital literacy skills that will enable them to move to online learning smoothly. This expatiates the current digital divide that exists in South Africa.
- **Attitude:** The challenges of accessing digital tools to address the perceived usefulness together with the level of digital literacy skills to address the perceived ease of use will impact the attitude of students toward online learning.
- **Behavioural intention:** Access to digital tools and digital literacy skills will influence whether students will modify their behaviour and utilise the online learning platform. Many students still lack the motivation to embrace online learning.
- **Actual Usage:** All these factors coupled together will determine whether students embrace digital transformation for the actual usage of online learning.

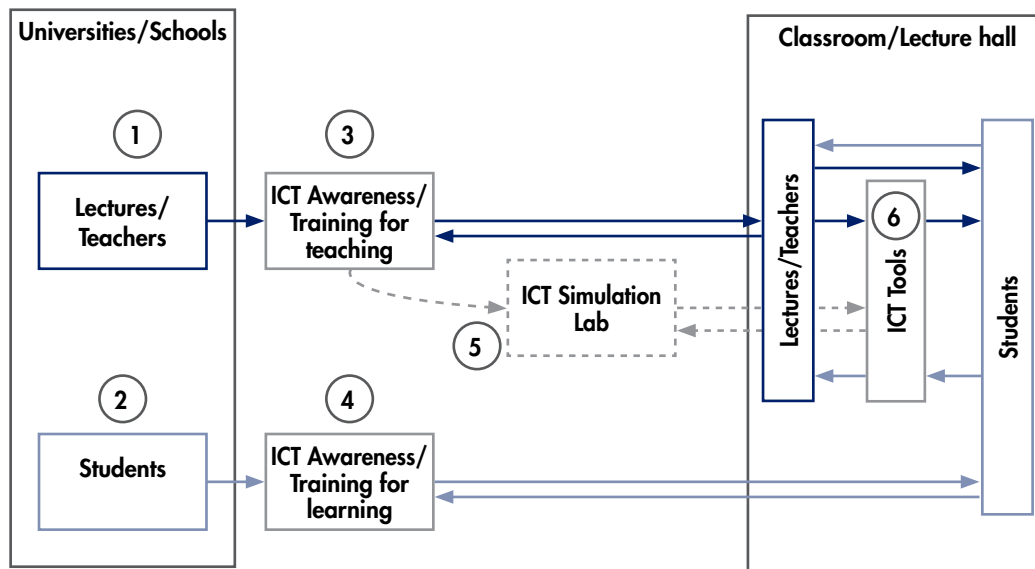
Social Constructivism Theory

Social constructivism theory created by Vygotsky (1978) maintains that learning is not purely an internal process, nor is it passive, but that culture and context are highly important in forming understanding and hence the beginnings of deep learning. The theory emphasises students rather than academics. Regrettably, constructivism creates a gap among students - those who have preceding knowledge and experience and those who do not. Students who have not been exposed to technology and have no previous knowledge will need to be equipped with basic digital skills (Merve, 2019).

ICT Framework for digital compliance in online learning

Higher education institutions must ensure that they are well equipped for the future of teaching and learning. Naidoo (2019) provides a possible framework in Figure 2 that proposes an ongoing process of developing both academics and students into becoming competent digital teachers and digital learners.

Figure 2:
ICT framework for Digital compliance in teaching and learning



Adapted from Naidoo (2019: 13)

Naidoo (2019) implies that students, as highlighted in number 4, must be provided with ICT awareness and training for learning regularly to be kept abreast with any new ICT developments they may require for online learning. Number 3 in Figure 2 indicates that academics must be equipped with ongoing ICT awareness and training for learning. Number 5 provides academics with additional practice to enable them to accurately familiarise themselves with teaching technologies before going to class with the added option to continue until they become proficient with using ICTs for teaching (Naidoo, 2019).

METHODOLOGY

The study used a quantitative survey design. Data collection was done using a survey questionnaire administered online via Google forms. The design of the questionnaire was constructed considering the constructs of TAM, perceived use and the usefulness of online teaching and learning. Social Constructivism was used as the general research approach. Approximately 200 respondents were contacted for this study, and 125 responses were received and analysed. Respondents comprised undergraduate students from the University of Zululand, Department of Communication Science, Richards Bay Campus. Random sampling was used so that all students had an equal opportunity of being selected. Kumar (2011) indicated that random sampling gives each element in the population an equal probability of being part of the sample, and all choices are independent of one another. Welman et al. (2005) also emphasised that simple random sampling allows each member of the population a chance of being included in the sample. In line with ethical considerations, all respondents participated voluntarily and could withdraw from the research at any time if they so desired.

Singh (2014) postulates that validity and reliability escalate transparency and decrease opportunities to supplement researcher bias in qualitative research. Forza (2002) insists that without measuring the reliability and validity of the research, it will be difficult to describe the effects of measurement inaccuracies on theoretical relationships that are being measured. Mohajan (2017) implies that reliability is determined by the correlation of the scores from two or more independent raters or the coefficient of agreement of the judgements of the raters. The commonly used internal consistency measure is Cronbach's Alpha (α), which is usually interpreted as the mean of all possible split-half coefficients. This was first named alpha by Lee

Joseph Cronbach in 1951, as he had intended to continue with further coefficients (Mohajan, 2017). This research utilised Cronbach's Alpha to measure the reliability of the study. What was the response rate? What was the Cronbach alpha on the survey items?

Reliability Statistics

Table 1:
Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardised items	N of items
.859	.824	06

The vitality subscale, consisting of six items, was found to be reliable. The value for Cronbach's Alpha for the questionnaire was $\alpha = .859$.

DISCUSSION OF RESULTS AND RECOMMENDATIONS

This paper sought to uncover the challenges faced by students at the University of Zululand in transitioning to online learning during the COVID-19 pandemic. Random sampling was used to distribute questionnaires online (via email, Moodle and WhatsApp) and after that analysed. MoonStats and Microsoft Excel were used for statistical analysis of data regarding the respondents' information and graphical analysis of data.

Figure 3:
Type of community you reside in

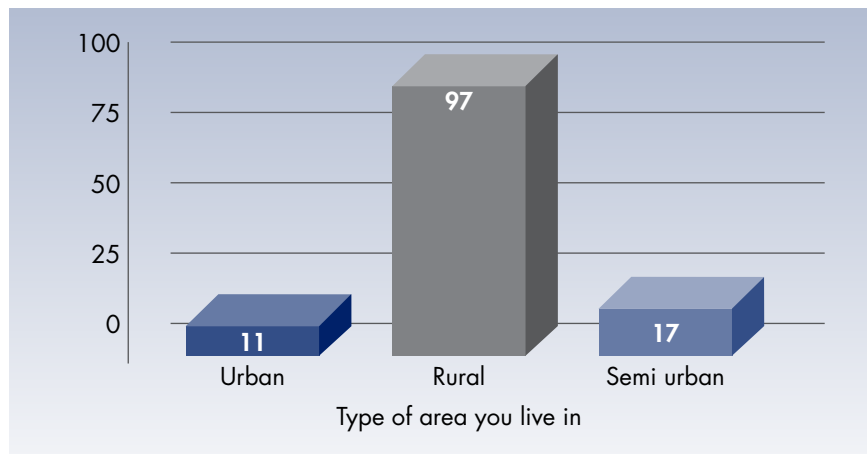


Figure 3 reflects that most of the students (77.6%) live in rural areas. A total of 13.6% of students live in semi-rural areas, and a small percentage of 8.8% live in urban areas. The bulk of students living in rural areas are impacted by the digital divide; the lack of internet access to basic digital tools and skills places them at a disadvantage. There must be a clear plan in place by the government to address this challenge, and students living in rural areas must be given priority. Failure to address this leads to disadvantages as the digital revolution accelerates.

Figure 4:
Level of Satisfaction with online learning

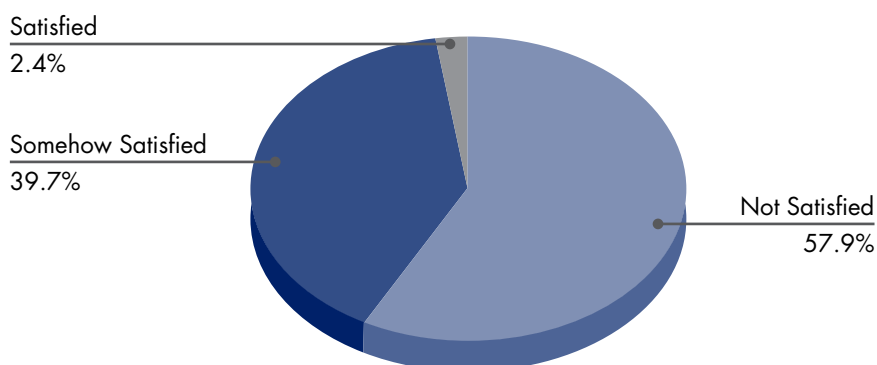
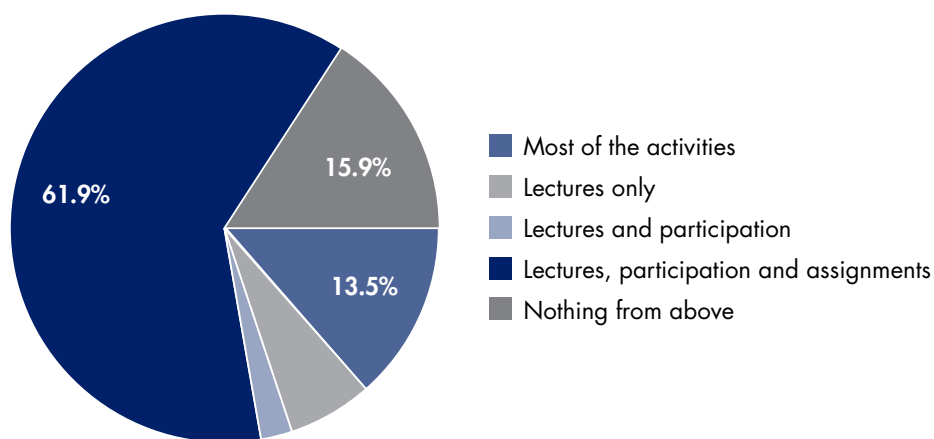


Figure 4 illustrates the level of satisfaction with online learning by students. Most students (57.9%) were not satisfied by the shift to online learning amidst the COVID-19 pandemic. Only 2.4% of students were satisfied with online learning, and the remaining 39.7% were somehow satisfied. Unsatisfied students are from rural areas, and because they face challenges with internet connectivity, they were concerned about how they will be able to progress. COVID-19 took all of us by surprise and further exposed the disparities South Africans face. These challenges need to be addressed.

Figure 5:
Moodle online activities



As can be seen in Figure 5, most students (62.4% - 78 students) pointed out that Moodle allows them to access lecture assignments, and they can participate on this platform. A total of 19 students (15.2%) were unable to use Moodle for anything, which is quite worrying as Moodle is the LMS that is currently used by the university. Sixteen students (12.8%) were able to complete most activities on Moodle, some (9 students - 7.2%) were only able to access their recorded online lectures, and the remaining three students (2.4%) were able to access lectures and participate in class.

Figure 6:
Alternative online platforms used

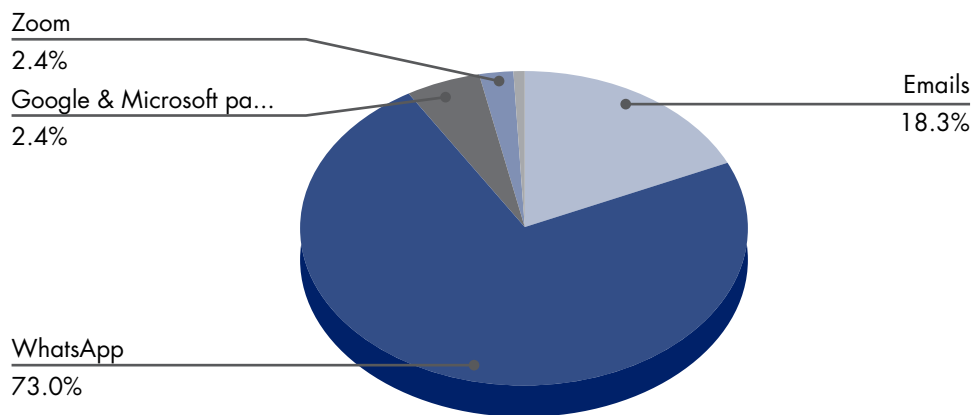


Figure 6 shows the alternative platforms students used when they could not use Moodle. WhatsApp (73%) is the predominant tool that most students use. Other alternative tools used were Zoom (2.4%), emails (18.3%), and Google and Microsoft platforms (5.6%). Moodle does work as expected for everyone. This could be due to the specification of their digital devices. More options should be made available for students.

Figure 7:
Challenges faced with online learning

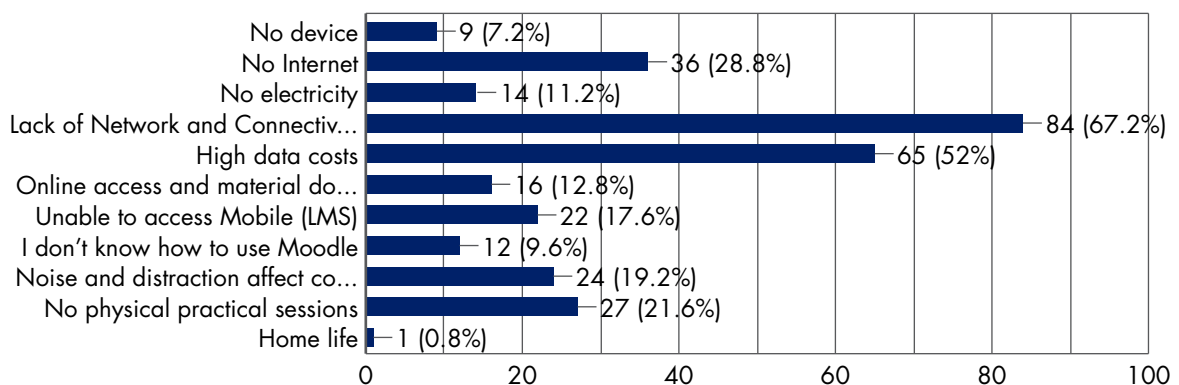
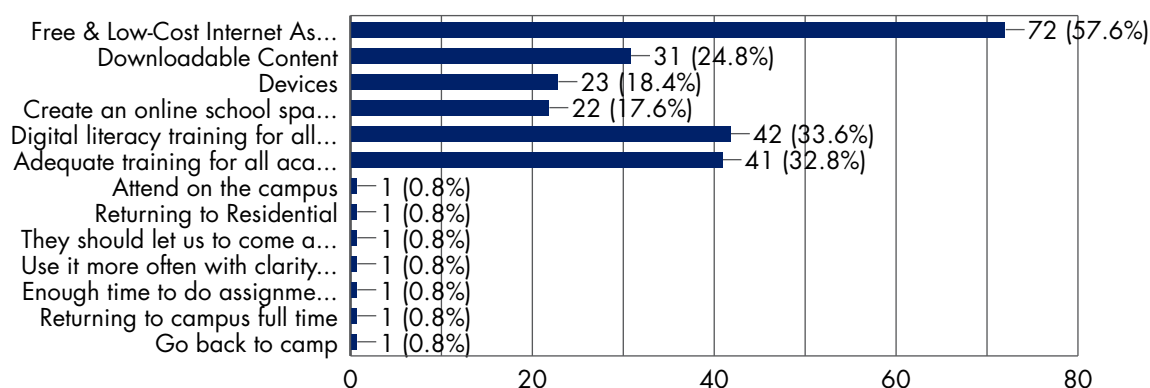


Figure 7 shows the challenges faced by students to engage in online learning. The main challenge was the lack of network and connectivity with the rural areas (67.2%), which hinders online learning. The high data cost (52%) is another obstacle preventing students from accessing their online content as many cannot afford data. Many students have no access to the internet (28.8%), illustrating the disparities faced by many students today. Some students do not have a device (7.2%) to use as a tool to continue with learning.

The students believed that internet data is expensive, and limitations on internet access and devices lead to difficulties for them to participate in online learning. Dlamini and Ndizinisa (2020) point out that issues of connectivity in rural and poverty-stricken communities remain unresolved. Hence, the main issues faced by students and lecturers in rural and online areas are connectivity and stable electricity; that situation meant that students began learning online without proper preparation, and their access to digital learning resources is minimal, affecting them from achieving their learning goals.

Figure 8:
Strategies to overcome barriers to online learning



The majority of the students (57,65) feel that free or low-cost internet will assist in online learning. Digital literacy training for both students (33.6%) and academics (32.8%) was also pointed out by a vast number of students to make the transition to online learning. Devices (18.4%), downloadable content (24.8%) and creating an online space for students (17.6%) will make it easier for students in the online learning environment.

Joshi (2021) suggests that the first (access and lack of internet access) and second (internet capability and usage skills and lack of internet capability and usage skills) digital divides are quite noticeable. Higher public spending on IT and the strengthening of existing digital infrastructure can play an important role in this transition phase in South Africa. This is the time to forge partnerships with the private sector, with chambers of commerce and industry to expand national-, state- and district-level capacities to ensure the online provision of education. It is imperative to mobilise all major telecom service providers to boost Internet connectivity service for online education, especially for the underprivileged and under-resourced regions. Padayachee et al. (2018) recommend that a supportive environment for online assessment should address the following issues: A hands-on approach to using the LMS including aspects of the online assessment environment requiring refinement are feedback, assessment setup, and online assessment design, and the user-friendliness of the assessment system. This would benefit all the lecturers and students making use of the LMS. There is a need to guide, encourage and motivate academics as well as students in universities to make a transition to online teaching by engaging motivational speakers, industry experts, and webinars. Lecturers have to be given guidance and training on teaching methodologies through live streaming of online tutorials during these difficult times. The issues related to accessibility, equity (digital divide), and lack of communication among the stakeholders, namely, administrators, teachers, students, and parents, need to be resolved to ensure better learning outcomes. This will also necessitate proper and quality training for faculty to enable them to navigate online platforms, including accommodating the interests of persons with disabilities and building a healthy and resilient cyber ecosystem (Joshi, 2021). There is a growing call for skilled leaders who should implement online educational policies that will aid the smooth transition for all stakeholders that are aligned to the vision and mission of the university. Along with effective contingency plans, reliability and sufficient availability of Information Communication Technology infrastructure, learning tools, and digital learning resources in the form of Massive Open Courses, e-books, e-notes, and so on, are of paramount importance in such severe situations (Huang et al., 2020).

All students and staff need to be equipped with digital literacy tools and have access to the applications and online learning platforms. Dhawan (2020) emphasises that online courses should be made dynamic, stimulating, and interactive. Partlow and Gibbs (2003) explain that online programmes should be designed

so that they are creative, interactive, relevant, student-centred, and group-based to maximise learning and effective teaching strategies for giving online instructions.

Mpungose (2020) avers that within the South African framework, there is a grave need for increased investment in the advancement of resources, both in universities and at the community level, due to the digital divide. Liguori and Winkler (2020) note that tools and resources to address this digital divide gap are gradually evolving, with traditional textbook publishers offering more online learning resources, private companies developing more and better online experiential learning curriculums, and simulation providers continuing to offer improved options. Dlamini and Ndizisisa (2020) advocate that using technology to intensify teaching and curriculum coverage is a step in the right direction, but the situation must be socially just to ensure fair access and distribution of learning resources across communities, especially among historically disadvantaged groups. There must be structures that link pedagogy, technology, and context to avoid creating systemic inequalities that affect individual students' experiences. Online learning can help provide inclusive education even in times of crisis, and such systems need to be developed in educational institutions that ensure that no student is left behind based on education due to their location, social class, and ethnicity (Dhawan, 2020:19). Lecturers should provide more particular attention and heighten communication through social media to ensure the students easily adopt this new method of learning.

The current allocation of data by the university and zero-rated LMS (Moodle), as agreed with ICT service providers, restricts students and hinders them from accessing an array of e-resources. Ramli et al. (2020) concur that the university also plays an important role to ensure that all students can access the required resources needed during online learning, such as a subsidy on the internet data or the telecommunication companies can provide free data for the academician and students to engage in online learning. The Malaysian government implemented this to ease the difficulty faced by students and academics.

Mpungose (2020) emphasises that despite challenges experienced by students in transitioning from traditional to online learning, the prominence of the digital divide is the main hindrance to students realising effective online learning. There should be a specific focus on the customisation of the Moodle (LMS) to meet the local needs of disadvantaged students so that online learning can be achieved.

There is also a need to have a dedicated ICT support team to assist students with online challenges they may face. This information must be effectively communicated to students and academics, so they know whom to contact. The university should provide a toll-free call line and/or email addresses to provide support for their students and staff. There are several national and international bodies and organisations that have developed principles, guidelines, and benchmarks for quality assurance and the use of technologies to support e-learning. These policies should be aligned to the digital competencies of students and academics so that all are on board with online learning.

CONCLUSIONS

The transition to online learning requires skilled leadership that can tackle the digital divide and finds ways of mitigating these inequalities. Although online learning may have been viewed as a panacea at the start of the pandemic, it has adversely affected students and may have further amplified the digital divide. The study exposed that the major challenges encountered by learners in students in transitioning to online learning were technical issues such as lack of network connectivity and high data costs with the majority of students residing in rural areas, thus the inequalities of the education system have been further exacerbated. This calls for urgent intervention strategies by higher education institutions so that all students have equitable access to online learning with none left behind. This shift to an online learning system helps redefine the learning system, especially the tertiary education system in South Africa. Investment in technology infrastructure, high-quality digital educational content, basic IT skills for students and academics, and local capacity building by involving local bodies, the private sector, and the public is crucial.

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