Chapter 13

Virtual Dis-Engagement: Exploring Digital Inequality in African Higher Education Institutions

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Abstract

The spread of the Coronavirus 2019 (COVID-19) is by far one of the most serious global threats to academics, teaching and learning in African Higher Education Institutions (HEI) in decades. Unsurprisingly, the surge in digitalisation and internet use has played a critical role in salvaging the academic environment. Universities have and are still increasingly shifting courses online at home. Whilst the internet is an important resource in efforts to stay informed and proceed with daily lives during the COVID-19 pandemic, these online approaches to reducing risk are not available to everyone in the same way. It is evident that poorer students who live in less affluent areas pay more for less reliable internet service provision. Although smartphones dominate most socioeconomic groups, they are still a poor alternative for broadband internet access for tasks such as online classes. The digital divide leaves the vulnerable student population who lack access to a reliable broadband internet connection, at a significant disadvantage when it comes to accessing and engaging with forms of knowledge transfer and acquisition.

These educational setbacks can have significant impacts on academic success, research and career opportunities. Rural communities have long been confronted with unique education challenges and chief among them is the digital divide. While millions of African students are grappling with the same challenges, HEIs have scrambled to provide students with resources, but many who live in low-income and rural communities continue to have difficulties. The digital divide is a problem that predates the pandemic, and is a problem that will persist long after it passes. Considering that some form of hybrid learning will likely continue for years to come, the broadband coverage gap is an issue that must be addressed.

Two years of the so called 'new normal' has seen HEIs embed and embrace online and remote learning in its organisational life and service delivery. However, there is still much room for management systems to be explicitly designed, innovated and implemented to reach those students from disadvantaged backgrounds. The situation requires stakeholders to take a fresh look at how the digital divide can be addressed. It requires innovative approaches and creative thinking from a policy and regulatory perspective. This article will therefore review the relationship between information and communication technologies (ICT) and digital inequality in online education in African Higher Education Institutions that impacts on teaching and learning.

1. Introduction

The global Coronavirus 2019 (COVID-19) catastrophe posed one of the most serious academic, teaching and learning security threats to the African Higher Education Institutions (HEI) in decades. COVID-19 had the potential to severely collapse the educational trajectories of approximately a million higher education students in SA. It was dramatically evident that ready or not, institutions had no alternative but to embark on a drastic intervention such as remote learning. Emergency remote teaching (ERT) was implemented, as a global emergency response and cautionary measure

(Department of Higher Education, 2020). Universities globally and in South Africa had to lock down and offer lectures online, while amendments were made for new ways to continue online education through the National Plan for Higher Education (South Africa. Ministry of Education, 2001). This has seemingly continued, post the COVID-19 lockdown, whereby teaching and learning pedagogies were embraced by a range of technologies, that were offered over learning platforms with various supporting resources and services. Unsurprisingly, this surge in digitalisation and internet use has played a critical role in salvaging the somewhat "reconstructed" academic environment. Despite shifting to online courses at home, some of these changes have not been advantageous for the majority of previously disadvantaged South African students in terms of access to digital technology and digital learning methods.

This chapter provides an overview of how online education has become the new norm post-pandemic and analyses the concepts of digital divide and digital inequality. It further offers perspectives on the main challenges of digital inequality that students in higher education face. Suggestions are provided on how the digital divide in higher education can be bridged and the solutions to ensure sustainability and longevity of these systems, based on the review of the literature.

2. Emerging of Distance Education as a Dominant Issue During the Pandemic

As the post-pandemic world continues to unfold, its long-lasting effects are far from being settled, particularly in an academic or learning environment. Higher Education Institutions have been forced to think differently and contribute innovative responses to the pandemic and one such way has been distance education as an emergency response to salvage the academic year. This saw the rapid switch to online education with useful guidance, advice, training to support educators or lecturers to make the best of this new educational emergency. However, the need remains for critical reflection

and appraisal on the global pivot to review the digitally mediated, remote learning world of the learner.

Bearing in mind that distance education, remote teaching, and online instruction are not new approaches to pedagogy or curriculum design, but in the face of the COVID-19 pandemic have taken on renewed salience. Whilst education became an emergency matter, educational technologies have, along with it, been positioned as a frontline emergency service (Whitley, Beauchamp and Brown, 2021). Yet, despite the uptake of distance education, its concept has become a matter of widespread concern for political affiliations, businesses, charities, teachers, parents and students alike.

The impact of the COVID-19 pandemic has left an indelible mark on a country's education system and one that will take many decades to be washed off. Notably, a digitalised platform of learning and teaching could be viewed as a 'first aid" solution or pandemic crisis management, in order to save the academic year in higher education. Understandably, HEIs were unprepared for the COVID-19 disruption, and good management practices were based on flexibility, strong communication, crisis team creation, digitalisation and remote work. However, while services were greatly impacted, virtual delivery was dependent on the availability of infrastructure.

Although academia may be able to reshape its knowledge and dispositions to function and respond to challenging times with distance learning as a post-pandemic spin-off, a further decline in ethical standards in teaching and learning outputs, can compromise academic integrity and credibility. These concerns therefore raise the following question:

Can academia handle the rigours of distance learning and student engagement through digital technology, without compromising the integrity of learning outcomes?

3. The 'Sacred Cow' or 'Trojan Horse' of Distance Education

The term 'sacred cow' refers to something that is immune from criticism, often unreasonably so. Here we apply it to the tendency to suspend our critical faculties when the term distance learning or e-learning is used. A Trojan horse on the other hand is a subversive device placed within enemy ranks, referring to the hollow wooden horse in which Greeks hid to gain entrance to Troy so that they could open the gates to their army. We apply this analogy to distance learning or e-learning in three ways. First, like the Trojan horse, distance learning has been welcomed into the academic city post-COVID-19 pandemic, to ensure and manage an engaged learning community.

Computing technology have been embraced by academics more readily. In doing so they may have prevented the whole concept of distance learning from being a subversive experience. Using distance teaching with all the available technology to its best effect calls for some fundamental rethinking of pedagogy (Kringos et al., 2020). In a learning institution, the challenge of fundamentally rethinking a paradigm would attract a large teaching team, but academics appear to work in silos and mostly approach the use of a digital learning platform as lone rangers. Thousands of teachers and educators, acting separately are less likely to develop a new pedagogy than a more concerted approach to solve the problem of having a disengaged class during online teaching.

Online teaching methodologies appear to be having less effect than it might in an area that welcomes opposition and disruption. Historically, educational media, made possible the revolution of distance learning, which was known to increase access, improved quality and provide cost effectiveness (Kringos et al., 2020). First world countries sing the praises of having harnessed distance education as a tool for extending access and offering a richer experience to existing students via online mediums. However, a more subtle but important point

to note is that the Trojan horse of distance education does carry with it a problematic stowaway.

4. Digital Education: The 'Sacred Cow' of Traditional Education is Slain

Distributive justice is a cause for concern especially in an unequal country such as South Africa, where there is evidence of unequal access to technologies used in online learning as well as unequal access to data and connectivity. Bearing in mind that access to technology does not automatically guarantee a successful pass rate, but it does play a crucial role in student knowledge acquisition that can impact on student throughput rates.

Undoubtedly, a digital platform of teaching and learning, if utilised wisely and in accordance with equitable resources, accessibility and availability, can eradicate all the challenges that come with securing funding for teaching and learning resources at our African universities. Understandably, the pandemic made emergency remote teaching an arduous task for institutions to implement, especially for those who remained grounded as on-campus, contact teachers. However, the changes that have emanated from the so-called short-term plans have now escalated to the "new normal" world of higher education institutions post-pandemic. So much so that contingency plans have had to be instituted to cater for students with access to online resources and those without access had to be developed. It is a fact that online learning is particularly challenging in Africa, where the student population is largely made up of those from impoverished areas. National leaders and governmental structures need to come together in robust discussions with the aim of embracing the new future of African higher education. The new future is a highly digitalised platform of teaching and learning that is consistent with virtual engagement and one that is inclusive of every student and irrespective of colour, caste or creed (Rashid and Yadav, 2020).

5. Remote Learning and Digital Autonomy

The 21st century has seen a rapidly evolving technological landscape in African HEIs and this has meant that university lecturers have been forced to adapt their teaching approaches without a clear roadmap for attending to the various needs and disparities amongst students. This has resulted in connectivity issues whereby conceptualisation of learning through a digital lens has become somewhat misfocused. Research to this effect has alluded to learning as the process of being unable to cross boundaries by creating valuable digital connections through the setting up of an interconnected network and modified pedagogies. Other sources note that distance learning can draw much from the available internet but continues to face challenges. In other words, for effective e-learning to occur from a distance, accessibility and availability is vital so that students may make connections amongst themselves and the lecturers, irrespective of hindrances faced. Naidoo et al. (2020) have stated that the digital divide amongst students in African HEIs is a hindrance to students as they are unable to realise the full potential of e-learning and distance education. They further add that lecturers still want students to submit assessment tasks and engage with course activities on the learning management systems. Suffice to say, with universities using face-to-face learning becoming vulnerable to the COVID-19 pandemic and other challenges which result in a shutdown of universities, viable alternatives need to be sought to allow students, particularly disadvantaged students, to utilise online learning platforms.

6. Digital Access

Whilst all young people in South Africa should have the ability to access and skills to use technology effectively and safely to achieve their own goals, whether educational and otherwise, it is extremely hard to get such structures and systems right for the student in higher education (Hussin, 2018). It therefore becomes apparent that there are some common questions that structures and systems in higher education

must address to ensure that virtual engagement and quality of higher education in African universities is enhanced. They are as follows:

1. What are the current challenges to digital access for students in higher education?
2. How can the digital divide be bridged in higher education?

7. Current challenges to digital access for students in higher education

As reported in a study by Naidoo et al. (2020), HEIs closed due to the pandemic, to curb its spread. Many lecturers and educators look to digital means to connect to their students. Whilst distance education remote learning saw a surge during the lockdown period, post-pandemic realities have allowed policy-makers to recognise that some young people are excluded from much of their education and their social networks due to the digital divide and other social injustices that border on inequality and a disadvantaged background.

Digital divide

Al Gore, former Vice President of the United States, used for the first time the expression 'digital divide' on the 29th of May 1996, to indicate the existing gap between the 'Information Haves' and the 'Have Nots', in relation to the K-12 educational programme in the United States (Kouame , 2012:31). The digital divide is the gap that exists between those who have access to the internet and reliable devices and those who do not. Soomro et al. (2020) refer to the digital divide as the disparity between people who have adequate access to Information and Communication Technology (ICT) and those who have none or poor access to ICT. Chang, Wong, and Park (2014) confirm that the digital divide is a complex and multidimensional problem and is the divide or gap between the population; the ones that have adequate access to ICT, and the others that have 'zero' or poor access to computers, the internet, and other digital devices.

Resta and Laferrière (2015) believe that the individuals who are excluded from internet access belong to the weakest sections of the population; in particular these people are subjected to severe social disparities, especially regarding both access to and the use of technologies. Since the early stages of the digital society, this inequality originated in a broad discrimination of human rights in the internet environment. This is the reason why the digital divide has a dual nature, which can be defined as both socio-economic and cultural. The authors posit that not only does digital exclusion lead to a knowledge divide, but it also narrows the openings for intercultural networks, communications, and understandings. Considering the negative effects of the digital divide on the economically disadvantaged and other marginalised groups, Rogers (2016) describes this as social injustice. Centeio (2017) confirms that inequalities exist in educational settings, while the digital gap persists despite rapid developments in technology. The issue is present across the globe and continues to be an area of social concern (Resta and Laferrière, 2015).

Jandric (2020) finds that the digital divide is a problem that affects people from all walks of life. It is a multifaceted issue, but two main characteristics define this gap: access to high-speed internet and access to reliable devices. Many of the individuals who struggle from the digital divide face both. In some areas, internet access is either limited, unavailable, or unaffordable for those who could be equipped. Even with a reliable internet connection, access to certain digital spaces can remain a challenge, always just out of reach for those who cannot afford costly tools like laptops and software. This leaves countless students and professionals to rely on public computers or their mobile devices as their only tools to exist in an increasingly digital world. It leaves many more, like those in rural areas or living under the poverty line, without even that.

Karar (2019) states that the digital divide is a multifaceted phenomenon which comprises social, political, and economic dimensions that influence any society. The social dimension of the digital divide indicates the income gap as an obvious determining factor affecting those who have

access to ICTs and those who do not. Finally, the global digital divide refers to the unequal distribution and access to ICT between the developed and developing societies. More gaps have been identified in the context of divergent digital access such as the education gap, ethnic and racial divisions.

Digital Divide in Africa

COVID-19 has shown the importance of connectivity. It has never been as important to share correct information and combat fake news, while being able to elicit information from citizens (and internet-users) on behaviour and movement. Van Der Merwe (2020) states that Africa is not nearly connected enough. It is still the continent with the lowest internet penetration rate at 39% of the population, compared to a global average of nearly 60%. There are large differences in internet access between rural and urban areas, with smartphone usage in urban areas exceeding that in rural areas by almost 200 per cent in some countries.

Suuk and Simon (2022) found that despite recent growth in internet connectivity, Africa lags behind other regions of the world. The World Bank hopes to help the continent achieve universal connectivity by 2030, but huge hurdles stand in the way. Over the past decade, African leaders working with various local and international partners have made great strides in making the internet accessible for the continent's 1.4 billion people. But, with just 22% internet connectivity, the continent remains significantly behind other world regions. Information Technology (IT) experts have long argued that data costs are too high for most people. In addition, lack of digital skills and literacy remains a stumbling block for many, particularly those living in rural areas.

In a report by the World Bank (2019), it is noted that across Africa, less than a third of the population has access to broadband connectivity, achieving universal, affordable, and good quality internet access by 2030 will require an investment of US $100 billion. This is according to a report launched at the Annual Meetings of the World Bank Group, which calls for

urgent action to close the internet access gap while providing a roadmap to reach this ambitious goal. According to the report, nearly 80% of all required investments are directly related to the need to roll out and maintain broadband networks. However, connecting the unconnected is about more than just infrastructure: about 20% of required investments consists in building the user skills and local content foundations, and another 2 to 4% should be allocated to setting up the appropriate regulatory framework, the report notes. While the private sector has driven most successful broadband initiatives, public agencies play a crucial role by implementing effective sector regulation, addressing potential market failures, and creating the conditions for an open, competitive broadband sector.

Oluwule (2022) reports that for fixed broadband speeds, Ghana is ranked 79th globally, and number one and the fastest in in Africa, with a speed of 53.28 Mbps. Ghana is followed by South Africa, which is placed 85th in the world. Egypt is ranked third in Africa. The cause of Africa's internet deficiency is, predictably, cost. Africa has the most expensive internet in the world. According to the Alliance for Affordable Internet, Africans pay on average 8, 8% of their monthly income to purchase 1GB of data, compared to 3,6% in Latin America and 1,5% in Asia. In some cases, like Chad, the Democratic Republic of Congo and Central African Republic, 1GB was found to cost as much as one-fifth of individuals' earnings. South Africa has the highest data cost among Africa's five largest economies (Oluwule, 2022).

Oluwule (2022) finds that costs are high because service providers are largely unregulated, and infrastructure is poor. In South Africa, a small number of companies control 70 per cent of the wireless broadband market, which has led to distortions in market prices. Market concentration in telecoms, which is a notable feature across the continent, is therefore largely responsible for the connectivity woes. The second reason relates to the first: because of poor or limited infrastructure for connectivity, there are large economies of

scale for providers, which makes it more attractive to form monopolies or oligopolies.

Africa is the second largest continent in terms of its population, which was estimated to be 1.2 billion in 2016 (United Nations, 2017). Most of the 50 plus countries in sub-Saharan Africa are categorised as low income or lower-middle income (The World Bank, 2019). African countries in general are ranked low on most social, health, and economic indicators. Sub-Saharan Africa is of importance in this report because it is the most marginalised and excluded region of the world. The continent of Africa is the one that is most affected by poverty and many other global challenges.

Van Deursen and van Dijk (2019) find that the gap between those who have and do not have access to computers and the internet seems to be a significant factor in limiting the feasibility of e-learning in a South African context. Their study shows that issues such as socio-economic factors, race, social class, gender, age, geographical area and educational background determine the level of the digital divide in a university context. While access to the internet and computers is high in developed European and American universities, African universities—particularly in the South African context—are still battling because of the intensity of the factors which led to the digital divide (Van Deursen and van Dijk, 2019).

Rodrigues et al. (2019) report that research shows that various programmes and policies have been developed and implemented to remedy this challenge; hence, universities provide students with free laptops and Wi-Fi (wireless network commonly allows technological devices to interface with internet) access inside the university and residences. However, little research has been done in the South African context to intervene in addressing university students' challenges (the digital divide) that hinder them from accessing e-learning from home. The authors contend that e-learning while students are at home, can never be realised in a South African university context unless the digital divide is addressed.

Van Deursen and van Dijk (2019) concur and assert that the digital divide remains the major issue and is one of the big limitations to the use of educational technology globally. These authors further argue that the digital divide is a real phenomenon that is here to stay in developed countries but is worse in developing ones. This suggests that although universities can provide free access to Wi-Fi within their perimeters and students' residences, including free laptops, there will be some students (residing in rental rooms or at home) who might not have access to the internet.

A report by the United Childrens Fund [UNICEF] (2020), on internet access among children and young people aged 25 years or younger shows that globally, around 2.2 billion, or two thirds of children and young people worldwide, do not have internet access at home, with considerable disparities observed by socioeconomic backgrounds. While globally, roughly 60 per cent of children and young people from the richest quintile of their countries have internet access at home, less than 20 per cent of their peers from the poorest wealth quintile do. Similar inequalities also exist in places of residence. Over 40 per cent of children and young people living in urban areas are connected at home, compared to 25 per cent of their peers living in rural areas. Still more concerning, a further disaggregation by a country's income level reveals that in low-income countries, internet access at home is nearly nonexistent for children and young people in rural areas or from the bottom wealth quintile.

Karar (2019) citing Van Dijk and Hacker (2003), indicates that the barriers to ICT access are the following:

- Lack of mental access which signifies the inadequacy of basic digital knowledge;
- Lack of material access which refers to the lack of physical access to ICT tools such as computers and the internet;
- Lack of skill access which indicates a shortage in the skills needed to deal with ICTs; and
- Lack of usage access that refers to meaningful usage opportunities.

While the answers seem obvious: e.g. the provision of laptops and / or internet access to those who do not have it, one has to be mindful that access to such services and devices is not a straightforward approach; it is multifaceted and fraught with red tape.

A study by Mpungose (2019) found most students not to have laptops, even though these were provided free of charge by the university. The same author reported that many of these devices issued to students had been apparently sold for personal benefit. They preferred to use mobile phones with free network data bandwidth for communicating amongst themselves. In other words, the use of modern physical resources provides an easy way to ensure e-learning, because it provides access to recorded lectures and electronic resources like videos, but it needs good planning. The main concern that hindered students from realising the full potential of e-learning was the expensive cost of internet infrastructure such as Wi-Fi routers, laptops, mobile phones and access to data bandwidth. Van Deursen and van Dijk (2019) argue that internet access and technological resources are the main limiting factors in universities in developing countries like South Africa, even though students do have skills to benefit from e-learning. In other words, the use of any available physical resources is not a problem to students in a digital age as the problem is the affordability and availability of those physical resources for e-learning.

8. Bridging the Digital Divide

The worldwide progress in digital education has been exciting to watch, with new advances being made seemingly each week. Even in a post COVID-19 pandemic era, the reliance on digital learning solutions has undoubtedly increased (Tamm, 2021). This raises the question as to how well South Africa will be able to address the ever-growing need for digital education solutions post-COVID, in the context of an already struggling education system.

Mpungose (2020) concluded in his study that the digital divide is a critical issue in the higher education landscape, and is not just technological, but also social, economic, cultural and political. This suggests that in alleviating the digital divide, universities, communities, churches, political figures, businesses and others must collaborate and come up with both practical and theoretical solutions in order to enhance effective e-learning post pandemic.

According to a report by Creamer Media (2017), South Africans, already marginalised in terms of education opportunities, risk being left further behind and even excluded from key aspects of the learning experience. For disadvantaged groups, many still living in areas where educational facilities are rudimentary, access to internet-based learning can provide them with access to high-quality educational resources at a cost significantly less than attending the institutions with associated costs of boarding and transport in addition to the fees. By ensuring more equitable access to the internet, government can support broader access to education across all socio-economic and race groups and geographic locations. In the last decade, the ICT sector has innovated and developed, though not at a fast enough pace to respond to shifting student needs (Creamer Media, 2017).

The Organisation for Economic Co-operation and Development [OECD] (2020) reports that regardless of obvious issues, it is evident that digital learning is expected to continue to be implemented widely. Globally, digital learning was already becoming a more prominent mode of education before the pandemic hit; and has merely been accelerated by the onset of COVID-19. Presently, the digital learning industry is experiencing a growth of 19% or more per year, and it is expected to exceed a value of $243bn by 2022 (Tamm, 2021). It is therefore evident that there is no escaping Africa's and South Africa's need to adapt to learning digitally. While Africa's digital environment may seem discouraging in terms of education and its restricted resources, there are ways for key issues to be addressed, and solutions need to be crafted collaboratively by various stakeholders. Government,

digital service providers and the education sector need to cooperate to identify solutions that work for individual contexts. Collaborative solutions are required such as increased access to mobile learning, sponsoring the provision of hardware, and providing open access to online educational resources and digital literacy training, among other potential learning programmes.

Mlaba (2021) states that 7.5 million low-income South Africans are paying 80 times more than middle- and upper-income citizens for access to the internet, exacerbating inequality in the country. South Africa's digital divide can be broken down into three factors: access to hardware, understanding digital means of communication, and internet affordability. These factors are having a negative impact on two of the country's best chances at development and equality, those being access to education and access to employment opportunities.

Strategies to bridge the digital divide

The development of accessible, sustainable and impactful free internet access models must be a joint effort. The government controls policy decisions and infrastructure and must have the political will to create a conducive environment for public-private partnerships to thrive. In the private sector, telecoms providers showed a capacity to place student needs at the forefront when they temporarily provided free internet access to university websites during the FeesMustFall protests. More sustained action can be encouraged through attractive government incentives for investment in the ICT-related facets of the education sector. Academic and research institutions must also be equal partners through ongoing consultation regarding their vision for ICT integration and the evolving needs of their students. Finally, civil society must also be engaged, as they represent the communities these programmes aim to connect. The success of these partnerships is what will ultimately enable the output of talented graduates who can contribute positively to the country's workforce (Creamer Media, 2017).

Provision of digital resources

In an article published in the Mail and Guardian (1 March 2021), the Motsepe Foundation (2021) reported that universities aimed for universal digital access for students, and largely succeeded; however, for students in remote areas, device access, electricity, water, conducive work spaces and high data costs were a significant constraint to access their courses, support and learning resources. Some universities provided data for all students, identified digitally excluded students and provided devices. The University of Fort Hare, for example, purchased 6 800 laptops worth R40-million for students who did not have their own. Universities are dependent on universal affordable broadband access—a national priority that still eludes us. Device access, digital literacy, infrastructure and systems are now an absolute necessity for education (Motsepe Foundation, 2021).

Mpungose (2020) supports the view that students should be provided with relevant traditional resources (books, manuals, chats, posts and others) and modern resources (laptops, mobile phones/ tablets, mobile Wi-Fi routers and others). In addition, free monthly Wi-Fi data bandwidth should be provided to students so that they may access e-learning, since this seems to be the main challenge to achieving e-learning in the South African context.

Almaiah, Al-Khasawneh and Althunibat (2020) propose that the university administration and technical support need to offer the necessary technical resources needed to conduct a constant technical maintenance for e-learning system, because sufficient access to e-learning materials without any technical problem or delay will be significantly associated with increasing the adoption of e-learning system successfully. Second, the university administration needs to provide the necessary hardware, software and internet connection, because if the universities are continuously update the necessary technological resources, then instructors and students would be able to implement the e-learning effectively.

Digital literacy training and empowerment

Gomez (2018) finds that even though individuals can access the internet, many are disillusioned by barriers to entry such as a lack of adequate infrastructure and lack of knowledge. These are two major obstacles that create the digital divide. These barriers limit individuals' capabilities in what they can do and what they can achieve in accessing technology. Increased investment is required in staff upskilling, training, equipment and infrastructure. Larger universities may be able to afford these costs, but smaller ones may struggle. With less money to fund studies as a result of the economic disruption of COVID-19, many young people post-pandemic are contemplating studying part-time. With the campus-based university model at risk as a result of the pandemic crippling after effect, universities are increasingly looking into partnerships with the private sector to expand enrolment through hybrid online degrees that allow students to work and study simultaneously with some campus contact.

As the gap between structured education, practical skills and work becomes smaller, the Motsepe Foundation as cited in the Mail and Guardian (2021) notes new forms of financing for education through the private sector. The residential universities have had a sustained experiment in remote learning thrust upon them by COVID-19. Some had already piloted blended models but COVID-19 forced all to consider radically expanding the scope and pace of this process. What the new university model might look like is uncertain, and many variants thereof are likely. Even when the digital access barrier to devices, data, connectivity, digital skills and digital literacy is overcome, the question of the best institutional and learning models, in the face of adversity, still needs to be answered. Traditionally, status quo and self-interest are unreliable guides in crisis intervention and South Africa would be wise to offer its universities the support and flexibility to attempt new and diverse approaches.

Vassilakopoulo and Hustad (2021) find that proper training and education can help mitigate digital inequalities.

Information campaigns also have a significant role to play, and digital divides may be narrowed if vendors engage in trust-building campaigns (Fox and Connolly, 2018). Integrating digital education into curricula can also contribute to reducing digital inequalities and education campaigns can stimulate the adoption and usage of ICTs bridging rural-urban digital gaps (Reinartz et al., 2018). Rural communities typically lag behind in digital skills, and digital literacy training programmes can improve digital engagement in rural communities. Digital literacy programmes targeting higher education students can help them develop the necessary skills and abilities to use digital mobile devices so that they could be part of the digital society (Fox and Connolly, 2018).

Ofusori (2020) finds that digital training and education are the key determinants of digital inclusion. With COVID-19 pandemic, technology is not a luxury but a prerequisite that facilitates active participation in the digital economy. Hence, it is important that all staff and students of higher education institutions are well-trained in the use of technology. ICT training should be at no cost to the staff and students and carried out frequently. Furthermore, the government can make ICT training multilingual in order to accommodate those people from disadvantaged backgrounds who may have limited understanding of the English language. This will enable better understanding as different languages spoken in South Africa will be used in the delivery of the training. This is because only technologically skilled and competent staff and students will be able to confidently perform effectively especially during the COVID-19 pandemic.

Development of internet infrastructure

Desrosiers (2020) states that there is little we can do immediately to address the internet structural inequalities in the middle of the COVID-19 crisis. But eventually one must reflect on divides, digital and other, that are woven into the very functioning of our higher education, to address this discrimination and close the digital divide. The internet depends on infrastructure to transmit information and the lack

of proper internet infrastructure, which is the case in many third world countries, means either poor internet connection or no internet connections.

The Development Bank of Southern Africa (DBSA) (2022) reports that investing in necessary infrastructure in this sector will ultimately provide an economic boost for South Africa. Digital infrastructure refers to services that make use of technology capabilities. This includes internet backbones such as fixed broadband, mobile telecommunications and communication satellites. When money is invested towards project development for digital infrastructure, it means that the networks mentioned above will be built. If the infrastructure is made affordable and accessible to the country's largest population, it introduces them to opportunities they were not privy to before. The development impact increases their access to information, networking opportunities, job opportunities and resources, as well as financial and social inclusion. This, in turn, activates the regional and national economic activity.

Ochao et al. (2022) concluded from their study on mobile internet adoption in West Africa that increasing mobile broadband adoption in Sub-Saharan Africa can have substantial direct and spillover effects, particularly among the most vulnerable socioeconomic groups. Expanding and improving the availability of affordable digital infrastructure, particularly in rural areas, and policies geared toward the universal coverage of 3G mobile services are key to mitigating the risk of a widening digital divide.

Increasing affordability of the internet

One of the chief internet adoption barriers in both developed and developing countries in the world is affordability. A large group of people cannot access the internet because of the high costs involved.

Reddick et al. (2020) found in their study that broadband access in the home is a necessity, especially since the COVID-19 pandemic. Increasingly, connectivity is of vital

importance for school, work, family, and friends. Their paper explored the digital divide in a case study in the United States; in San Antonio which is a majority-minority city where over half of the people are Hispanic. The paper focused on the five key affordability factors that drive broadband adoption. The authors found evidence that four of the factors (geographical disparities, profit-based discrimination, technology deployment cost, and socio-economic factors) played a role in the digital divide in this case study. The results of this study demonstrated that the digital divide is not exclusively a rural/urban digital divide but can also occur in an intra-city context. This is especially evident in low-income areas within the city because they have substantially lower broadband adoption rates. The results of this study demonstrate the importance of looking closely at issues of social exclusion of marginalised groups and the affordability of broadband access intra-city.

Ochoa et al. (2022) add that mobile broadband coverage must be complemented by measures to ease critical barriers, notably those related to affordability, as well as those faced by sociodemographic groups being left behind. To promote digital adoption and, in parallel, to expand coverage, it is crucial to ease the budget constraints on households and foster competition in the ICT industry to converge to competitive pricing in services and assets. It should also be a policy priority to address other potential hurdles to the adoption of mobile internet, such as those related to digital literacy, access to electricity, and the barriers faced by women and farmers, which could hamper the adoption of digital technologies, particularly in poorer, rural areas.

Policymaking to close the digital gap

Policymaking is considered instrumental for closing the digital gap and a mix of policy measures has been suggested in prior research. Policy initiatives can include subsidies targeting specific digitally disadvantaged segments such as a rural population. For instance, governments can apply strong intervention policies to provide equitable ICT access also in rural areas (Park et al., 2015). Burtch and Chan (2019) note

that digital divides may be addressed by crafting policies to equip underprivileged groups with better communication skills, enabling meaningful engagement with digital platforms . Government policymakers can collaborate with schools and universities to support students from low-income households through the provision of home computers aiming to reduce the effect of socio-economic inequalities among students.

9. Conclusion

During COVID-19, South African universities were compelled to find new initiatives to adapt, putting unprecedented strain on students and lecturers across the country (Mpungose , 2020). These initiatives have affected not only aspects of multimodal teaching and learning approaches, but social transformation in South Africa and around the world. Whilst recognising the diverse student population one has to be cognisant that online learning is not only growing into an accepted mode of teaching, with its arms wide open in embracing 4IR, but will require continuous adaptation, resource allocation, bridging of the digital divide and monitoring to ensure the programme's rigor and integrity. The pandemic impact and post-pandemic impact has exposed multiple levels of inequalities that in higher education include differential treatment of students based on their background such as closed access to knowledge and research results, unevenness in global patterns of research collaboration and lack of access to the basic requirements of digitalised higher education such as devices, internet access, and electricity. The urgency of addressing these inequities must be kept at the forefront as higher education begins to think ahead to create a more equitable post-pandemic world. Our article highlighted that to overcome the digital divide, there needs to be a concerted effort to address the barriers that prevent students from accessing and using technology. Governments, civil society organisations, and private companies must work together to promote digital inclusion and reduce the digital gap. Digital inclusion can be promoted by including policies and programmes that provide affordable

and accessible technology, digital literacy training and initiatives that address cultural and socio-economic barriers.

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