

Online Learning during the South African Covid-19 Lockdown: University Students Left to Their Own Devices

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Abstract

After the announcement of a national lockdown by the South African state in March 2020, university students and lecturers had to conduct learning activities online. In countries where reliable information and communications technologies exist, this transition was relatively smooth. Students were able to learn using internet-based online learning systems. This is not the case in South Africa. Based on in-depth interviews with some students and lecturers and the use of internet resources, this article demonstrates that the participation of students from poor and working-class households evinced many deficiencies. This is because South Africa's information and communications technology infrastructure disadvantages poor and working-class households. The poor access to online learning that students from working-class and poor households experienced demonstrates that in South Africa the argument about the promise of the Fourth Industrial Revolution, which must supposedly be embraced by everyone, is simply not tenable and is not supported by any evidence. Instead, many working-class and poor South Africans, as shown by facts presented in this article, have not even realised the assumed benefits of the Third Industrial Revolution, which comprises information and communications technologies. For the students who participated in this study, poor information and communications technology infrastructure and the challenges pertaining to access to laptops and computers made online learning during the lockdown very difficult.

Keywords: online learning; information and communication technologies; students; universities; lockdown; Covid-19

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Introduction and Background

Research is showing that countries that invested in information and communications technology (ICT) before Covid-19 and its attendant lockdowns were able to cope well with online university learning during the lockdowns (Li and Lalani 2020). According to the Organisation for Economic Co-operation and Development (OECD 2020, 1), “China, which was hit first by the corona virus, is already well advanced in providing a large share of its students with access to online learning opportunities.” In addition, countries of the Global North with developed ICT infrastructure were also able to develop support mechanisms for university students and lecturers (Li and Lalani 2020).

In contrast, the South African state failed to make meaningful investments in ICT infrastructure before the emergence of the COVID-19 pandemic, leading to many university students (and the vast majority of high school students—not discussed here) having to fend for themselves when President Cyril Ramaphosa announced a strict lockdown in March 2020. The lockdown meant that many university students had to vacate their residences, which had learning facilities and access to computers. Practically, they also had to leave behind their rooms, study halls, dining halls, libraries, and face-to-face support from tutors and lecturers. For the majority of black students from poor families in urban and rural areas, this meant that they were going to homes that had little or no access to communications networks.

As far as learning spaces were concerned, students from townships had to go back to homes that were small and overcrowded, because the post-apartheid state failed to deal with the housing crisis created by colonialism and apartheid. Students from rural areas returned to places with poor or no access to the internet networks required for online learning (Arashi et al. 2020; Sokhulu 2021).

South Africa’s huge digital divide, caused by privatisation and poor state regulation of ICT, means that the vast majority of citizens have poor or no access to the internet and inadequate cellphone communication. To a large extent, South Africa has not realised the much-vaunted technological revolution, which made it difficult for students from impoverished communities to access online learning easily during the lockdown. The first part of this article examines how university leaders and some academics have responded to the challenges of the lockdown and online learning. This is followed by a discussion of the so-called technological revolution and the role of ICT in it.

Subsequently, the article argues that the African National Congress (ANC) government has not been able to deliver the so-called Third Technological Revolution to the overwhelming majority of the South African population. Towards the end of the article, some of the students and lecturers who participated in online learning during the lockdown describe their experiences.

Online Learning and the Lockdown: Limits of Responses of University Leaders

An emerging strand in the literature on online learning in universities tends to engage in marketing gimmicks or “beauty contests” among universities. Instead of focusing on how to address the crisis of infrastructure and the lack of access to ICTs, university leaders and prominent academics are hell-bent on showing how their universities “did well” during the lockdown. In seeking to promote their institutions, they ignore the responsibility of university leadership, stakeholders at universities, the South African state, and the broader civil society to collectively provide ICT infrastructure for South Africa. Although these scholars mention “inequality”, “social justice” and “the digital divide” as issues that need to be addressed, their discourse often seeks to show that their universities were able to cope with the challenges of online learning (Motala and Menon 2020; Wits University 2020).

In one instance, the University of Johannesburg’s response to Covid-19 and online learning is reported to be in the same league as that of a university in China, which was able to cope with online learning during the lockdown in that country. The reader is not told that the Chinese ICT infrastructure was superior to that in South Africa, and therefore the comparison is invalid (Yu and Zhao 2021). Although Motala and Menon (2020), both of whom are employed by the University of Johannesburg (UJ), raise some important issues pertaining to inequality and the disruptive nature of the pandemic, in the final analysis, the message is that the university’s leadership was flexible and innovative throughout the crises caused by Covid-19 and the lockdown (2020, 85–86).

Adam Habib, who headed the University of the Witwatersrand (Wits) during the lockdown, speaks about how Wits had built “public-public” partnerships by working with the South African Post Office (a state corporation) to deliver laptops to students in urban and rural areas during the lockdown. Such measures should be commended because they strengthen the state, which has a historic mission to improve the conditions of marginalised sections of the South African population. Furthermore, like other universities, Wits had reached an agreement to zero-rate online teaching content with the main cellphone and data service providers in South Africa (Wits University 2020). The zero-rating of online teaching content meant that those students who had access to gadgets to enhance communications and internet could access learning materials free of charge.

Focusing on an individual university’s effective responses to the lockdown misses the bigger picture of the political economy and what can be regarded as the proverbial elephant in the room: the post-apartheid state’s failure to deliver the Third Technological Revolution or the post-1970s Third Industrial Revolution (3IR), a revolution based on computer technology. Motala and Menon (2020) mention the debate between those who want to use the pandemic to “accelerate” online learning and those who are, correctly, calling for a political debate about the implementation of the

Third Industrial Revolution and the Fourth Industrial Revolution (4IR) and the role of online learning during and after the pandemic. However, they fail to contextualise online learning in their analysis (2020), or to acknowledge that the overwhelming majority of South Africans live under conditions of the botched so-called Third Industrial Revolution. Asking working-class people and the poor to embrace what they call the Fourth Industrial Revolution, which is constantly referred to by the Vice Chancellor of UJ and those who share his perspective, is like asking them to hug a mirage.

Not only are many students and academics having to contend with inadequate access to the infrastructure of the 3IR, but they have to come to terms with the fact that the South African state has failed to deliver a key element of the twentieth century's Second Industrial Revolution (2IR), which was based on the provision of electricity. Internet access in homes and workplaces becomes impossible during periods of loadshedding imposed by Eskom, and this compromises the quality of online learning further (Hlatshwayo 2019).

Added to this, as Sayed and Singh (2020, 34) point out, is the fact that “the education policy needs to counter the growing privatisation and ‘uberisation’ of education, in which the idea of a common public education is deinstitutionalised and delegitimised”. South African university principals and leading academics have not used the opportunity of the lockdown to collaborate in designing non-propriety platforms to enable online learning that responds directly to the specific pedagogical challenges faced by students and lecturers. Solutions have tended to occur within the confines of the capitalist market, which means that private companies continue to profit from the crisis. Computer Science departments at universities and ICT experts could have worked with the state's agencies to explore online platforms to provide for the country's pedagogical requirements, but this option was never seriously explored. Universities South Africa (USAf), a national association of university principals, has not, as far as the public is aware, made any call for the state to strengthen Telkom, a 39% state-owned enterprise, in order to deliver telecommunications to the South African public. As Mhlanga and Moloi (2020, 10) have proposed, the South African state should adopt “mechanisms of fiscal expansion” and invest in ICT infrastructure so that students have unhindered computer access and can benefit from the so-called 3IR.

The So-Called Third Technological Revolution and the ICT Infrastructure

In defining the first two of the ostensible four technological revolutions, Xing and Marwala (2017) argue that the first one, which began in 1769 and ended in 1870, was driven by coal, steam engines, textile industries and iron. The second technological surge, which began in 1870, utilised the electricity supply, the systems of mass production introduced by Henry Ford, and the use of diesel, petrol and plastics in production processes (Cooper 2011). However, in South Africa, the absence of electricity infrastructure and loadshedding (the interruption of an electricity supply to

avoid excessive loading of the generating plant), which occurs for weeks in some areas, together with the unaffordable price of electricity, and the complete lack of any electricity provision in some rural areas, show that the 2IR—which is essential for online learning—is largely non-existent for many in South Africa (Lindeque 2020) and undermines the online learning programmes of universities.

Cooper (2011) reveals that what is often neglected in the debates about technological revolutions, including the 3IR, is that some of the leading North American universities, such as the Massachusetts Institute of Technology (MIT) and Stanford University, were central in the development of the 3IR. The 3IR would have been impossible without the universities, because they required advanced developments in quantum physics and electronics, which often occurred in partnership with the state and private companies. It was this use-based research that led to the 3IR in the late 1970s. Silicon Valley, which produced companies such as Google, Apple, Facebook, Twitter, WhatsApp, and Snapchat, was a direct result of the work of Stanford University and its partners (Cooper 2021; Stone 2014).

It appears that “high science” is not being harnessed to address the developmental challenges facing South Africa. The lack of dialogue on the role of universities, the state and civil society in addressing problems of infrastructure—for ICT in particular—has led to the digital divide: the gap between those who have access to ICT and those who do not, or who have partial or poor access to it (Van Dijk 2020).

What is referred to as the 4IR builds on the 3IR, but represents a fundamental change in the manner in which people live and produce goods and services. According to Schwab (2015), the 4IR involves the use of productive technologies such as biological elements, genetics, data, robotics, and 3D printing to advance production methods. In the context of the 4IR, ICT has been developed further to include voice recognition technologies, blockchain, big data, 5G networks and the use of other forms of high-speed internet (Schwab 2015).

Despite persistent calls for South Africa and the universities to embrace 4IR, especially by the Vice Chancellor of UJ, Tshilidzi Marwala, and others, the state has failed to ensure that the local population has access to electricity, which affects economic development as well as learning opportunities (Hlatshwayo 2019).

The next section deals in more detail with the ways in which post-apartheid South Africa has botched the 3IR by entrenching a digital divide that mirrors social and economic inequality in the country.

Political Promise and the Reality on the Ground

The ANC held a crucial conference in Morogoro, Tanzania, in 1969, 25 years before the democratically elected government came to power in 1994. The strategy document formulated at this conference outlines the overall objective of the liberation struggle:

Our drive towards national emancipation is therefore in a very real way bound up with economic emancipation. We have suffered more than just national humiliation. Our people are deprived of their due in the country's wealth; their skills have been suppressed and poverty and starvation has been their life experience. The correction of these centuries-old economic injustices lies at the very core of our national aspirations. (ANC 1969, 1)

In other words, according to the ANC, the liberation struggle was largely about making sure that those who were oppressed economically and politically by colonialism and apartheid would benefit by getting access to wealth, basic services, skills and improved living conditions. On the eve of coming to power in 1994, the ANC had this to say about telecommunications and ICT:

Telecommunications is an information infrastructure and must play a crucial role in South Africa's health, education, agricultural, informal sector, policing and safety programmes. Under apartheid the provision of telecommunications was racially distorted. For black people it is estimated that less than 1 line per 100 persons is in place compared with about 60 lines per 100 white persons. Other countries with comparable per capita wealth have 30 lines per 100 persons. The situation is far worse in rural areas. (ANC 1994, 38)

Consistent with the programme adopted in Morogoro, the ANC views telecommunications and ICT as an issue that needs to be addressed before dealing with any other injustices or imbalances. Advancing the 3IR by providing access to ICT for the black majority is a key task, according to the Reconstruction and Development Programme (RDP) document (ANC 1994). Subsequently, in 1996, the ANC-led government adopted the Growth, Employment and Redistribution (GEAR) policy. This moves away from the notion of the post-apartheid state as the main provider of services such as ICT, rather favouring privatisation and regulation. For example, as part of the privatisation programme, Telkom received a strategic equity partner (Department of Finance 1996). This marked a shift away from the developmental approach espoused by the RDP to the strategy advanced in the GEAR planning, which defines the state as a "privatiser" and deregulator of ICT services (Duncan 2012). The new policy further entrenches the digital divide, and this obviously affects students. The user-pays principle was unable to deliver ICT to aid their online studies.

The National Development Plan (NDP), a national policy document published by the South African state in 2011, notes that communications infrastructure was crucial for development and economic growth. The plan argues that South Africa must become a strong "information society" with a "knowledge economy" (NPC 2011, 170). Despite this, government agencies charged with implementing the NDP have been riddled with corruption, ineptitude and privatised profit-making. State investment in ICT has also been undermined by misguided investments (Gillwald, Mothobi, and Rademan 2018).

In her critique of the ANC's discussion document on communications, Duncan (2012) argues that the ANC has not been able to fulfil the promises of the liberation struggle in transforming the ICT sector because of privatisation and deregulation, and this has led to private monopolies dominating the poorly regulated ICT market. The partial privatisation of Telkom, for instance, led to profits being lost to external investors, and to the high tariffs charged by Telkom. Duncan (2012, 1) adds: "This problem is coming back to bite the ANC, as the shrunken nature of the network limits the country's ability to build a high-speed broadband network using the fixed line backbone." Duncan's (2012) comment is still relevant and supports the argument that the ANC-led government's failure to universalise the ICT infrastructure has contributed to universities' failure to deliver online learning for many students.

At the ANC's national conference held in Johannesburg in 2018, the state's market-orientated policies in the ICT sector are strongly criticised. The negative aspects of the 4IR are noted, and it is argued that the state should position itself to take advantage of the 4IR by accelerating the delivery of ICT to disadvantaged communities. Implicitly agreeing with Duncan's (2012) analysis, the ANC complains that the state had not been able to redress the imbalances in the ICT sector and offered a number of reasons for this: high data costs, the poor quality of internet connections, and the lack of internet connectivity experienced by many families. The ANC argues that state companies such as ICASA, Telkom and the Post Office should be modernised and provided with resources so that they could improve access to ICT infrastructure for impoverished communities (ANC 2018). Figure 1 illustrates the net effect of the ANC's failure to lead the 3IR in South Africa over the past 25 years.

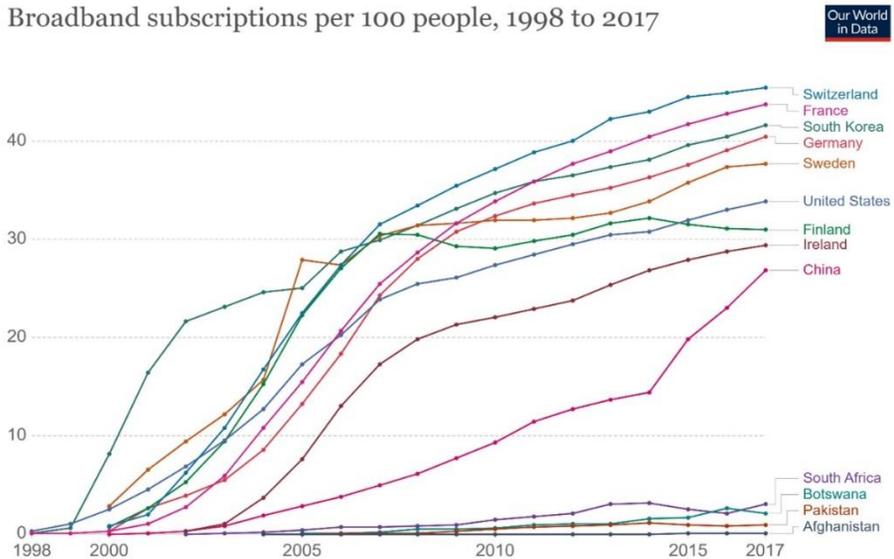


Figure 1: Broadband subscriptions per 100 people, 1998 to 2017. Compiled by the author based on World Bank (2020) data

Figure 1 shows that South Africa is among those countries considered to have very poor access to technology, despite the fact that it has no visible wars and is not a poor country. It shows the number of fixed broadband subscriptions per 100 people in selected countries, including South Africa. The figure refers to fixed subscriptions to high-speed access to the internet at downstream speeds equal to or greater than 256 kilobit per second. The means of connection include cable modems, digital subscriber lines (DSLs), fibre to the home and other fixed broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband. Subscriptions via mobile-cellular networks are not included. From China to Switzerland, each had from 27 to just above 40 people per 100 connected to fixed broadband subscriptions in 2017. South Africa was in the group of very poor countries, including war-ravaged Afghanistan, that had less than three people out of 100 connected to fixed broadband subscriptions in 2017. This is startling, since electricity provision has a long history in South Africa: as early as September 1882, Kimberley became the first town in the Southern Hemisphere to install electric street lighting, even before it was used in London. That the ruling ANC has been unable to deliver electricity for the Second Industrial Revolution—something that was implemented in Kimberly 138 years ago—is a serious indictment on the ANC as a ruling party (Hlatshwayo 2019).

In July 2020, a webinar attended by leaders of universities in France, Germany, Finland, Ireland, Sweden and Switzerland, as well as South Africa, shows that universities had

to adopt online strategies for teaching and learning during Covid-19 and lockdowns. What emerged was that the universities of the Global North are able to cope better because their governments had built a stable ICT infrastructure before the emergence of the pandemic. For example, the Freie Universität Berlin has a highly developed ICT infrastructure, and offers about 90% of its courses online, with the exception of practical course work. This is not to say there are no problems: for instance, French universities have had to devise plans to assist students from working-class families (Segar 2020).

The students and lecturers at Peking University in Beijing managed to cope better than those who are based in South Africa with online learning since ICT infrastructure was implemented before Covid-19. This is confirmed by the United States' (US) Department of Commerce (2019, 1) whose report on China noted that "China's information and communication technology (ICT) market is among the most dynamic sectors in the economy". By 2021, the ICT market was expected to be \$8.1 trillion, which is about 55% of China's gross domestic product (GDP). China's imports of ICT products and services in 2017 amounted to \$528 billion, and exports were \$781 billion (US Department of Commerce 2019, 1). Bao (2020) concludes that the university's online system was not only made possible and relatively successful by its infrastructure, but by its strong support mechanisms for students and lecturers. In addition, there were contingency plans to address unexpected problems.

It is tempting to think that the United States of America has no connectivity or access problems, because the 3IR happened there. It is one of the countries that have high-speed internet, but it is not without its own serious digital divide, which is detrimental to the lives of marginalised people. As countries of the Global North implement neoliberal policies in the form of budget cuts on ICT infrastructure and intense privatisation, working-class people, migrants and others become victims who are unable to access the benefits of the 3IR. For example, in late March 2020, during the peak of the Covid-19 pandemic, 62% of the people in the United States did not have access to the government's minimum download speed for broadband internet. To demonstrate this, the Bronx County in New York, a working-class area of New York City's five boroughs, saw a drastic drop in broadband speeds: the median broadband speed dropped by 10 megabits per second (mpbs), which meant that people in the area struggled to download videos and documents. To complicate matters further, one report concludes that 42 million people in the US had no access to the internet (Holpuch 2020). Furthermore, rural areas in the US have also suffered from the digital divide, so that online teaching and learning is subject to glitches (Lai and Widmar 2021). Poor connectivity has led to many students leaving their homes to forage for open WiFi spots in towns, making remote learning an uncomfortable and stressful endeavour, even in the US (Holpuch 2020).

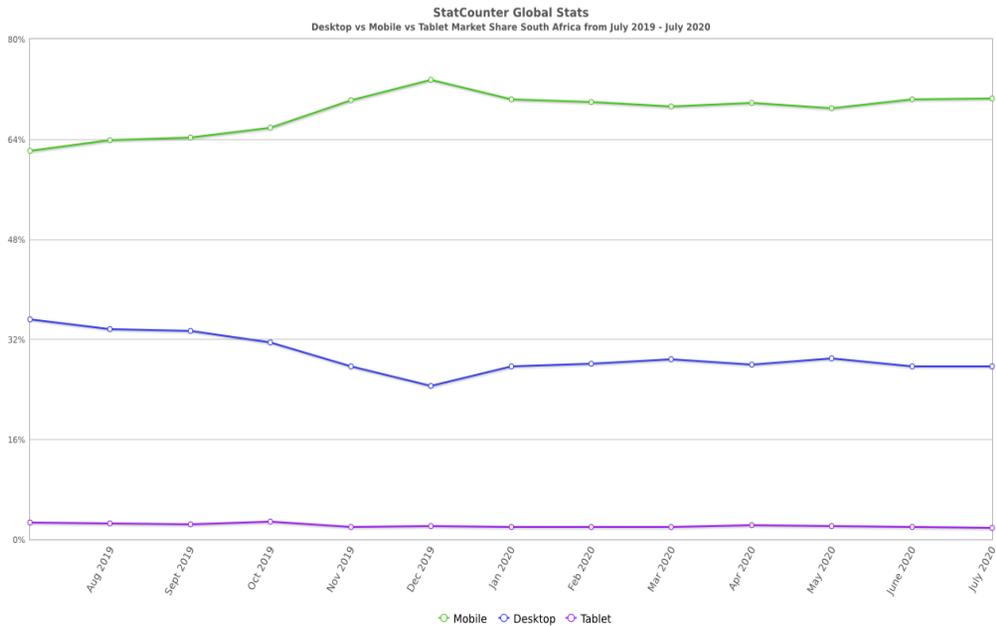


Figure 2: Desktop vs mobile vs tablet market share in South Africa. Compiled by the author based on Statcounter (2020) data

Figure 2 shows the market share of desktop, mobile and table devices (including laptops) from August 2019 to July 2020. Desktop devices are superior when it comes to writing long documents, communicating, and watching online videos. Laptops and desktops can speed up the writing and communication process, especially for those who can touch-type. Laptops and desktop machines are included in the desktop platform together (Bradley 2012). To perform their academic functions, it is critical that students have access to laptops and desktops, because they are essential for writing assignments and communicating with lecturers. They also need to access lectures in the form of videos and slide presentations. In March 2020, when the lockdown was announced, the market share for laptops was 28.1%; the market share for tablets was at 2.02% and for mobile phones it was 69.17% in South Africa (Figure 2). Germany had a 52.29% market share for desktops in March 2020 (Statcounter 2020). Clearly, South Africa's market share for laptops is low, and the findings confirm that access to laptops for students was one of the hindrances to online learning.

Besides poor access to laptops, South Africans pay astronomical prices for data. In 2019, the average price of one gigabyte (GB) of data in South Africa was R106.20, as compared to India where the price was on average R3.84 per GB. Out of 230 countries, South Africa was ranked 143rd among countries with high average prices (Kesler 2019).

Private data and internet providers have a monopoly over the communications market, and they charge exorbitant prices for data and voice communication. Airtime for calls

used to be automatically transferred to data without requiring any form of permission from the phone owner; this caused the rapid disappearance of airtime.

Not only has the state generally failed to regulate the data networks, but it has not built adequate ICT infrastructure that is independent of private providers. The “data must fall” movement called for access to data and quality internet connection. It compelled the South African Competition Commission to demand that companies reduce data prices and end the other unethical measures that imposed punitive prices (Amandla.mobi 2020).

The low levels of investments in ICT infrastructure by the state has far-reaching implications for impoverished students. Unlike students in countries with developed ICT infrastructure, they suffer as a result of the state’s failure.

Interview Responses from Students and Lecturers

I interviewed lecturers and students from universities in Gauteng, the Eastern Cape, and KwaZulu-Natal, who were involved in online teaching and learning during the lockdown. Since I do not want them to be penalised for participating, I will refer to them using pseudonyms.

Online Teaching and Learning during the Lockdown

Lecturers were asked to reflect on how they prepared for online learning during the lockdown. Mtuti, who teaches first-year students, says:

There wasn’t any pure consultation. So they [the university managers] just told us [lecturers] “Now you are going to teach online”. They [the university managers] also didn’t know what to do. So in a way they [the university managers] were making it up as they were going along because they kept on chopping and changing. So, in a way as a lecturer you had to find your own ways of doing things. Fortunately, I took it as a struggle, because I realised that for the students the situation was worse. The students were between a rock and a hard place; I mean the vast majority of them cannot afford to repeat courses next year. They just want to complete the academic calendar. (Mtuti, telephonic interview, 7 August 2020)

Mtuti’s testimony concurs with a call made by a post-school working group of academics in the C-19 People’s Coalition, which sought to organise working-class and rural communities during the pandemic. The working group argued for consultation between stakeholders in universities in order to find solutions to learning under difficult conditions. Based on Mtuti’s interview, it appears that lecturers who were supposed to teach online gave no input on how learning should take place (C-19 Coalition Post-School Working Group 2020).

Even before the lockdown, academic teaching had become more demanding. Lecturers had to teach big classes, grade many scripts, and attend meetings, and they were

expected to publish regularly (Pillay 2020). All lecturers interviewed for this study indicated that online teaching intensified their workloads. The lockdown ended face-to-face contact with students. Mdumazi, who is a lecturer, explains:

Now you have to make sure that you write detailed slides. Basically, you have to use coherent sentences, and that is time-consuming. You also have to do voice over explaining the content in the slides. You upload the slides with voice-overs and also the ones with no voice-overs. Sometimes you do a short video. That is time-consuming. Remember you must still answer questions via emails. I have not yet spoken about tests and marking. (Mdumazi, telephonic interview, 10 September 2020)

Those lecturers who were already using online platforms such as Blackboard and Moodle were able to cope better during the lockdown (Maphalala and Adigun 2021). Mfundisi, who lectures at a rural university, comments:

Yes, of course everyone had to double their efforts. It's just that I happen to be well established in online teaching. I used to spend time using online platforms to teach even before the lockdown. Many of my colleagues struggled to teach online during the lockdown, because they were not used to this platform. (Mfundisi, interview, 12 August 2020)

Lecturers and students who were interviewed were concerned about the quality of learning during the lockdown. One of the lecturers says: "Now we are using the banking notion of education. We are just depositing information into students through this online learning. The students have to send what we taught back to us in the form of assessments. There is no debate between us and students" (Mulawuli, telephonic interview, 12 September 2020). A student leader says: "We are also concerned about the quality of online education, and we have been discussing that with the university management" (Ligi, telephonic interview, 25 August 2020).

Gadgets, the Urban and Rural Divide and Loadshedding

Students also described their personal struggles when the lockdown was announced and they had to pack their bags and leave their residences. Lulama, an honours student at one of the universities, says:

Okay, so lockdown was introduced, we have to go back home, so obviously, speaking from my experience, I did not have a laptop, so that would mean I need a library to be open or I need an internet café to be open, which wasn't the case. Fortunately, I had a friend that [lent] me [a laptop] although I couldn't connect to the internet using it, so I had to rely on my phone which is not so smart. So, it's like a magnitude of other problems, you know, that I have encountered; but I personally had to also encounter dealing with the fact that I am at home, my siblings and the level of noise is expected, but I did expect them to keep quiet when I am in class because that is what I have been doing daily. So that was one of the challenges because I was used to being obviously at [university] residences. (Lulama, telephonic interview, 23 August 2020)

The honours student raised many problems also mentioned by other students. Because students were uprooted from their university residences, they had to adjust to home environments not designed for academic activities. Like Lulama, many students had no laptops or desktop computers, confirming the findings of Statcounter (2020) that in South Africa such access is low. The loss of living and studying spaces was a serious challenge for Lulama: her siblings were noisy and the family home was overcrowded even before the lockdown, so online learning was particularly difficult (Mahlatsi 2020).

Poor internet connectivity also caused problems as students struggled to hear online presentations by lecturers on platforms such as Zoom (Bangani 2020). The difficult conditions caused stress and mental health issues among both lecturers and students, and some students decided to drop out. A student leader, who is a member of the Student Representative Council (SRC) at one of the universities, says:

Our university has been trying not to accept deregistration by students. The university has been encouraging students not to drop out. The problem is very serious due to the fact that besides the challenges of online learning challenges, many parents have been retrenched. The lockdown has led to loss of jobs. Parents cannot afford to pay fees. (Ligi, telephonic interviews, 25 August 2020)

Mfundisi (telephonic interview, 18 August 2020) was worried about students from poor urban and rural areas. He had a class of 300 students, but the participation rate by online students was between 50 to 60 students. He says:

I do not follow the deadlines. I give them enough time to complete assessments. I even encourage them to email assessments to me, especially those who cannot use Blackboard [an online learning programme]. I even accept handwritten assignments. The challenge is that marking never ends. I am marking throughout the term, as I have to make sure that students, especially those from rural communities and working-class areas, have the opportunity to participate in the learning process.

In a study that examined the conditions of students in rural areas during the lockdown, Dube concluded that online learning tends to exclude students from these areas. This happens precisely because these students have very poor access to online gadgets and the internet (Dube 2020).

Mtuti confirmed the findings of Dube (2020):

Of course, there was that problem of connectivity, like in the rural areas the network is not good; but the worst part is with Eskom on the attack again in black working-class townships ... there's a lot of loadshedding there. ... Electric supply is very, very thin and it goes away anytime. So some students would send their stuff hand-written and things like that. (Mtuti, telephonic interview, 7 August 2020)

As well as loadshedding, working-class townships regularly face power blackouts for days on end. For example, Johannesburg City Power technicians were alleged to have

been held hostage by some residents of Alexandra, who were frustrated after a five-day outage.

Eskom's failure to deliver electricity contributed to the already poor access to online learning. It was worse for students who had to go back to rural areas. Mtawuli, another student, says:

I have a friend who comes from rural Mpumalanga; he was doing honours in accounting. Just last week he told me that with everything that is happening he is unable to continue with his postgraduate degree. That is someone who was able to at some point connect on the internet. (Mtawuli, telephonic interview, 18 August 2020)

Clearly, if this student's university had asked the students to stay at residences, his academic career could have been saved. The draconian, blanket approach that was adopted was devastating to the aspirations of many students. Those who had access to computers and the internet at home should have been asked to leave the residences in order to create space for the other, less advantaged students.

A lecturer who teaches in a university that caters mainly for students from rural areas raises a concern:

Students from rural areas are asking, "When are we coming back to the university? We have no access to internet and electricity. We are left behind." And there is not much that the university can do. The country has no proper IT [information communication] infrastructure and electricity is another problem. The state should have made sure that all areas are developed and have electricity and IT. (Ayanda, interview, 10 September 2020)

The lecturer is correct in pointing out that the ANC-led government has not fulfilled the promise of infrastructure development, which would have made it possible for all students to learn online. What makes it worse is that the state did not even consider working with the universities to accommodate rural and poor urban students in hotels, bed-and-breakfasts and other places with internet access. It would have been easy for students to observe all the lockdown rules in these places.

Mfundisi indicated that the core of the problem is the question of infrastructure for learning. He elaborates: "Universities can throw data; they can provide gadgets. We also need the infrastructure that is also going to create an enabling environment for things to happen" (Mfundisi, interview, 12 August 2020). He argues that even if rural students had computers, the critical issue was the lack of infrastructure in many areas. In the same vein, Ahmed Bawa, CEO of USAf, indicated that the online learning system enabled the universities to learn about the "infrastructure shortfalls" and that the infrastructure problem must be resolved (Africa Reporter 2020).

The findings presented here generally confirm those of other researchers who have raised a number of issues pertaining to challenges faced by the students and lecturers who participated in online learning. Surveys and qualitative findings point out that students and lecturers were not generally prepared for online learning: a lack of access to ICT infrastructure, computers and laptops was a hindrance to it; the lecturers were working very long hours, and students and lecturers were also faced with mental illness in the process of performing online learning duties. In some instances, high workloads led to students and lecturers feeling suicidal (The Campus 2021; Macupe 2021).

Culpability of the State and Universities

What is often missed in the debate about online learning and the lockdown is the fact that the failure of the ruling ANC to meet the historical demands of the liberation struggle, such as housing, water, and other basic needs, has had a negative effect on online learning, if the complaints raised by Thobani Zikalala, a student who participated in a webinar during the lockdown, are analysed and contextualised (Africa Reporter 2020). In other words, the failure to make sure that working-class and poor families have access to proper housing makes it extremely difficult for students like him to successfully participate in online classes. In an exchange between Habib, the former Vice Chancellor of Wits University, and the Deputy Minister of Higher Education and Technology, Buti Manamela, the latter complained about universities such as Wits leaving students from working-class and poor families behind while embarking on online learning during the lockdown. While Manamela's concerns are legitimate, Habib's response exposes the fact that university leaders were not able to raise critical issues that go beyond defending their own narrow institutional concerns. Habib could have laid the blame squarely at the feet of the state and the ruling ANC. He could have said that if the state had provided ICT infrastructure and decent housing for working-class and poor communities, as is done in other countries, online learning would have been easier for many students, especially those such as Zikalala. In addition, as a university leader, Habib could have taken responsibility for not engaging the state and the academic community to resolve the ICT issue (Molele 2020).

The lockdown and the problem of online learning also exposed deep inequalities between universities. While historically white universities spoke enthusiastically about how they used their "institutional agility" to respond to the challenges of online learning by providing devices and data, it appears that historically black universities, which carry most of the social and economic burdens as they tend to admit a majority of poor black students, were not able to supply their students with free data on time. Mfundisi (interview, 12 August 2020), who works for a historically black university, explains: "Because data only became available very late, it was in the middle of the lockdown. At the beginning of the lockdown they [students] were really struggling, because data is very expensive."

The glaring weakness in the responses of university leaders and USAf is that they did not use the opportunity of the lockdown to negotiate with the state to do two things.

Firstly, they could have asked the state to finance accommodation and ICT infrastructure for students who did not have access to the internet, so that they could have been accommodated in university residences and hotels, which were empty because of the lockdown. This would have helped to temporarily mitigate the infrastructure problem that disadvantaged so many students. Secondly, they could have stressed that the country urgently needs to address ICT infrastructure and reliable access to electricity. In other words, the ruling ANC and the state should have been pressured by leaders of the universities to develop a concrete plan for solving infrastructure problems.

Research and funding for innovations linked to the aims of the liberation struggle should tie the research agenda of public universities to the developmental needs of those who were oppressed by colonialism, capitalism, racism, apartheid and society in general. The issues raised here clearly indicate that the state ought to form research partnerships with universities in order to solve ICT infrastructure and electricity problems. While accepting that online learning is not a panacea or a proverbial silver bullet, Jantjies (2020) reports on an ICT project that helps working-class children learn how to use computers. Such partnerships between the state, universities and rural and working-class communities could help solve the ICT infrastructure problem and develop learning platforms orientated towards universities. Learning platforms that promote multilingualism can also play a major role in South Africa, where English is not the first language of most South Africans.

One of the problems with the debate on the 4IR is that it is devoid of any discussion on how to use technologies to advance the historical demands and issues of the liberation struggle, such as access to electricity and ICTs. Orientating universities and the state to a developmental agenda requires a radical restructuring of the state subsidy formula. This would be necessary in order to make sure that resources of the state fund basic, practical research that responds to the infrastructure needs of poor communities. This is why there has to be a discussion about the repurposing of universities so that they can contribute to the realisation of the demands of the liberation struggle in the short and medium term; universities working with the state can play a major role by means of applied research that responds to immediate and practical issues, such as providing access to computers for students.

Orientating universities and the state to a developmental agenda requires a radical restructuring of the state subsidy formula. This would be necessary in order to transform the current state funding regimen for universities, and for higher education in general, which often perpetuates agendas initiated by the apartheid regime to subject the black majority to racist separate development. Such a strategy requires strong student formations, progressive academics and non-governmental organisations (NGOs), grassroots formations in rural and urban spaces, and radical trade unions.

Therefore, a funding formula that responds to development challenges in historically black universities and poor and working-class communities is what needs to be agreed upon in the first place. The biggest challenge in this regard is the need for strong democratic and public mobilisation to shift the neoliberal sociopolitical agenda of the ruling ANC and to make sure that it responds to the needs of the students and the poor.

An example of such mobilisation is the C19 People's Coalition, a working group that emerged as a response to COVID-19 and the subsequent lockdown's effects on post-school education. This group called for a halt to online learning and the resumption of face-to-face learning once the rate of infections subsided. Pointing out that online learning favours urban-based universities and students from middle- and upper-class backgrounds, the group made concrete proposals for preventing the digital divide from becoming further entrenched by online learning (Naidu 2020). The C19 People's Coalition is one attempt by communities, trade unions, social movements, students and academics to restate historical demands for access to electricity, ICT, food, education, health facilities and housing (Naidu 2020). However, the weaknesses of the student formations, after relatively successful campaigns against fee increases and financial exclusion in 2015 and 2016, indicate that the C19 People's Coalition, trade unions and social movements still need to do a lot more organising to put pressure on the government to ensure that ICTs and electricity can be accessed by all. Radically shifting the orientation of universities and the state to serve the interests of working-class students and all economically marginalised communities can only occur through mass mobilisation in the form of grassroots and shopfloor organising.

Conclusion

Online learning during the lockdown has revealed a huge mismatch between the academic discourse on 4IR and concrete developments on the ground. Promoting 4IR in the context of loadshedding, blackouts and the very poor ICT infrastructure amounts to chasing a mirage. A great deal of research has shown that the real discussions should be about how to make sure that South Africa has an adequate supply of electricity and ICT infrastructure.

Broadly speaking, this study has shown that the notion of the 4IR that is propagated by some leaders and academics at many South African universities is not grounded in South Africa's developmental needs and realities. Unlike countries in the Global North, China and South Korea, which have a developed technological infrastructure, South Africa has a long history of uneven development, characterised by extreme underdevelopment of working-class areas. South Africa does not fit into the linear narrative of the Fourth Industrial Revolution, simply because the South African state has not been able to deliver the most basic instruments of the first three technological revolutions, namely public transport, electricity, and ICT. For example, discussing high-speed trains, "smart" cities, artificial intelligence and other aspects of the 4IR when South Africa is unable to deliver electricity, which is the foundation of all technological revolutions, is not helpful, particularly to students who have to participate in online learning

programmes. In other words, the discourse of development has to have some relevance to the developmental needs of South Africa. In this regard, Maharajh (2021, 98) elaborates:

The ahistorical and decontextualized rendition of the “fourth industrial revolution” has rapidly entered the global discourse on development, descended upon world systems and has influenced its wholesale and unproblematised adoption by the elites of South Africa. It poses the gravest threat to a proper understanding of what is meant by the national system of innovation and presents a strong intellectual challenge to both the society and its public institutions of knowledge production.

Unlike other narratives on online learning during the lockdown that have an institutional and learning focus (Corbera et al. 2020; Hedding et al. 2020; Motala and Menon 2020; UJ 2020), this article moves beyond those confines, and links the crisis of online learning to the failure of the state to carry to its logical conclusion the second technological revolution for the provision of efficient and reliable electricity and, related to that, the third technological revolution in the form of ICTs. The article lays the blame for the failure to make sure that students from working-class and poor families have access to reliable online learning at the door of the state, especially given the ANC’s promise of improved living and learning conditions for students from poor households. Covid-19 and the consequent attempts at online learning have exposed inequalities among institutions and within student populations. If the post-apartheid state had built ICT infrastructure and delivered electricity equitably, the pain suffered by many students could have been avoided, as was the case in countries that invested in power supplies and ICT infrastructure. Furthermore, university leadership on a national level should also be called to account for not actively and consistently challenging the state for not delivering ICTs before and during the lockdown.

Meeting the developmental goals of a democratic society, such as the need to build ICT infrastructure to serve students from marginalised communities, requires the radical reconfiguration of the state and the universities. Further research to define the roles of universities in attaining the second and third revolutions is needed for general infrastructure development that breaks with the geopolitics of apartheid planners and their failed approaches to development.

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