African Universities – Working towards an Inclusive Digital Future in a Post-COVID-19 World

Krish Chetty
Human Sciences Research Council – Inclusive Economic Development, South Africa

Thierry M. Luescher
Human Sciences Research Council – Inclusive Economic Development,
Higher Education Studies, University of the Free State, South Africa

Abstract

In response to COVID-19 restrictions, many African universities rapidly implemented online learning. This article identifies a set of critical success factors which should inform a university's decision to adopt online learning. Online learning potentially amplifies existing inequalities among the student population where matters of digital inclusion are not addressed. By analysing documents from a selection of African universities, we review how they responded to lockdown restrictions. Our analysis applies our framework of critical success factors from the university, the educator and the student's perspectives. These success factors include an institution's socio-economic circumstances, cultural readiness and e-readiness, participation in decision-making, and educators and students' personal and household-level circumstances. Our study highlights important learnings and makes recommendations towards an inclusive digital future of African universities in a post-COVID-19 world.

Introduction

Over the course of their history, African universities have become resilient to various crises and learnt to quickly adapt to restore conditions for the academic community to function. At some point, most African universities have experienced interrupted tuition due to social conflicts, violent student protests, virus outbreaks or even civil wars.[1,2] The duration, intensity and scale of such crises can typically not be predicted; African universities have often been forced into circumstances that require difficult decisions in a context of uncertainty. The events may have a disruptive impact on the university community for a limited time only; yet, the choices made during such periods of crisis often continue to define the university's functioning well after the crisis has passed.[3]

In 2020, due to the coronavirus pandemic, African universities had to rapidly respond to state-instituted lockdown restrictions while trying to 'save the academic year'.[4] The lockdown required university leaders to determine if so-called emergency remote teaching and online learning were feasible and a pedagogically-sound alternative to on-site, face-to-face teaching.[5] In many respects, efforts to introduce online learning were already underway for the higher education sector to adapt to and garner the benefits of technology and communication changes.[6] Correspondingly, Adotey argues that higher education institutions in Africa need to prepare for disruptions to traditional learning, which will require greater reliance on online learning technologies.[7]

Recognising the costs of a lack of tuition on the student and economy due to the COVID-19 pandemic, the Association of African Universities (AAU) called on African universities that have stable online connectivity to implement online learning urgently.[8] The AAU argued that this was an opportune moment for Africa's ministries of higher education to strengthen their university systems to make them more resilient to future uncertainties. Therefore, it also called on governments to invest in digital infrastructure in rural areas and promote access for all those unable to access online educational services.[9] Increasing reliance on online learning technology has education policy and budgetary implications for the sector. Online learning can be resource-intensive and costly. It also comes with many obstacles for disadvantaged students and universities. A change to an online learning model – irrespective of the wide reach of massive open online courses (MOOCs) – potentially excludes many students across the continent. These students normally benefit from a campus environment that makes up for the lack of a conducive home learning environment, the necessary information and communications technology (ICT) and service infrastructure, and/or personal learning challenges that only campus-based student services can mitigate.[10]

For instance, the challenge of disparities to digital access across Sub-Saharan Africa (SSA) is startling. Approximately 89 per cent of students from primary school to higher education do not have access to a household computer, and 82 per cent of students across all levels of schooling have no internet access in their homes. Further, 56 million students from SSA live in rural areas that are still not served by mobile network operators.[11] Consequently, students from low-income households and rural households came to be deprived of learning opportunities as the education system was forced to transition to emergency online learning. To overcome these

disparities and promote greater inclusion, social and education policies that address structural inequality and exclusion are required.[12]

In this respect the notion of inclusive online learning is important. Inclusive online learning demands that disparities are addressed in many domains where otherwise the campus environment provides a levelling of the playing field: basic infrastructural disparities that affect poor students need to be addressed, including those specific to enable online learning per se, such as reliable electricity supply, and internet, device, radio and television access while living in remote or informal areas. Furthermore, there are concerns related to the pedagogical quality of online learning: the delivery of course material online may not be a suitable replacement for teaching in the classroom. It can also not replace the need for specialised equipment and the practical and studio work required in some programmes. Moreover, students with learning disabilities, for example, tend to be more disadvantaged in a remote online learning environment where no campus-based remedial and support services are available.[13] Furthermore, the vast majority of the continent's sizable youth population currently remains without access to Africa's elite higher education systems.[14] This lack of access requires African policymakers to investigate the feasibility of various online learning modalities and the potential opportunities they offer the continent's youth in a post-COVID-19 world.

Finally, the degree of readiness to adopt online learning among different African universities has also varied substantially and requires further exploration. Some universities have had various experiences with online learning, on and off-campus, prior to the coronavirus pandemic; some operate with a resource base that has made them more successful at mitigating the disadvantages that poor students face given the disparities at personal, household and community level when having to study from home.[15] Only when online learning can be inclusive and effectively increase the opportunities to access higher education will this system of learning counter the effects of inequality.[16] The question is, how have African universities risen to meet the challenges of the COVID-19 crisis and have they provided their students with the digital infrastructure foundation for a future transition to online learning?

In this article, we address this core concern by exploring the following research questions:

1. How have African universities responded to the challenge of lockdown due to the coronavirus pandemic? What emergency remote teaching / online learning/online teaching modalities and platforms have African universities adopted?

2. What are the relevant critical success factors involved in online learning adoption in developing countries that apply to the varied and unequal contexts found across the African continent and universities?

3. Has a dependence on online learning under lockdown exacerbated the effects of inequality among students of African universities, given existing challenges of rurality and poverty, infrastructural disparities and the digital divide, as well as home-based and personal challenges such as home-care duties, disabilities and the like?

4. What are the longer-term benefits from investments in online learning infrastructure?

In answering these questions, we have conducted a review of technology adoption models, focusing on online learning adoption in the context of developing countries. For this purpose, we

build on Taherdoost, who provides a review of technology adoption and technology acceptance models and thus provides a foundation for our examination of contextually relevant adoption/acceptance models.[17] From our review of related studies, we discern a set of critical success factors relevant in developing country contexts, which African universities ought to consider when transitioning to online learning models.

In the second part of the article, we analyse the COVID-19 lockdown related to the online learning efforts of a selection of seven African universities. The seven universities were selected from a larger set of higher education institutions involved in '*The imprint of education'* research project of the Human Sciences Research Council (HSRC). These include the African Institute for Mathematical Sciences (AIMS) (South Africa, Rwanda, Ethiopia, Kenya, Uganda),[18] Ashesi University (Ashesi) (Ghana), Kwame Nkrumah University of Science and Technology (KNUST) (Ghana), Makerere University (Makerere) (Uganda), University of Cape Town (UCT) (South Africa), University of Gondar (UoG) (Ethiopia) and University of Pretoria (UP) (South Africa).

We analyse the efforts that these universities undertook in the context of their country's lockdown policies and in relation to the proposed national strategies to reopen universities. In our analysis, we consider the institution, educator, and student perspectives as we apply our framework of critical success factors. We also highlight practices designed to address the digital divide challenge and promote greater access to and inclusion in higher education. Our research has exclusively been desktop-based, and our sources are all documents available in the public realm. Our information has been sourced from institutional documents published on the websites of the selected universities, higher education sector bodies, ministries, scholarly and news articles, and reports published in relevant local, national or international online publications (such as *University World News*).

In the final part of the article, we present our concluding thoughts on ways that inclusive access to higher education in Africa may be promoted through online learning to achieve an inclusive digital future in a post-COVID-19 world.

Transitioning from Emergency Protocols to an Inclusive Digital Future

The experience of past crises on the African continent and beyond teaches that emergency protocols often turn into, or inform, new standard operational policy after a crisis subsides. In light of this, it is important to distinguish emergency remote teaching from effective online learning. These are the terms used to describe the current use of digital technology in higher education. In response to the COVID-19 mandated lockdowns, many universities have implemented emergency remote teaching, which is defined as 'a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances. It involves the use of fully remote teaching solutions for instruction or education that would otherwise be delivered face-to-face or as blended or hybrid courses'.[19] Emergency remote teaching is essentially a short-term crisis response to replace face-to-face classroom teaching with some online version of education provision so that students continue to have access to certain learning materials and instruction.[20]

Effective online learning, in contrast, follows from an intentional and systematic instructional design that is carefully planned to reach the students using online technologies and ensure quality online learning. The lesson designer has options when designing such instructions as lessons may range in modality between fully online and a form of blended online lesson delivery, in pacing, pedagogy, the role of assessments, role of student and instructor and forms of feedback.[21] Effective online learning is designed to be more student-centred, innovative and flexible in its design, using synchronous and asynchronous forms of online contact with learners. The form of teaching must also be informed by the student's digital connectivity and fluency.[22] In contrast, the decision to pivot to emergency remote teaching is not solely focused on an inclusive lesson design, does not guarantee equitable online access, nor does it offer digital fluency.[23]

Beyond understanding the modalities of designing effective online learning, African universities must prioritise digital inclusion when moving into the online learning space. Inequality across the continent remains pervasive, even among the university community. This inequality translates into unequal access to and usage of digital facilities such as personal communication devices, internet access, data affordability, depending on your location – limited mobile or fixed-line broadband internet coverage and the knowledge to use such facilities.[24] These inequalities can be particularly acute in the university context. For example, a University of the Free State study found that 50.3 per cent of students did not have the means to pay for expenses other than their basic subsistence and tuition.[25] Such expenses would include the cost of digital devices, applications and internet access (data) now critically needed to transition to emergency remote teaching. An inclusive digital future for the university would recognise these disparities and actively introduce measures to bridge this divide.

Critical Success Factors for Effective Online Learning in Developing Countries

The critical factors that determine the success of effective online learning adoption in developed nations do not necessarily apply in a developing country context where students contend with various aspects of inequality, poverty, and poor provision and reliability of public services in some areas. Technology adoption models generally frame one's choice to adopt new technology based on its perceived usefulness, ease of use and advantages.[26] This view, however, neglects concerns of inclusion that are paramount in the developing world. During the COVID-19 pandemic, African universities have had to make difficult choices in adopting online learning modalities to solve the challenge of lockdown and mandatory social distancing. In this environment, the forced-choice to rapidly introduce online learning was brought on by regulatory fiat and necessity, given the pandemic's dangers to the university community.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) has identified three models for online learning adoption in developing countries: the industrial, mass-media and small-scale models.[27] The industrial model involves the mass distribution of standardised learning content produced by a team of subject matter specialists. Traditional

higher education institutions typically implement the industrial model, and over time, due to increasing class sizes, this approach has resulted in minimal interaction between student and lecturer. Thus, what initially was intended to be structured as a guided study approach has, over time, evolved into an independent study approach, as described by Czerniewicz.[28] As an example, the University of South Africa (UNISA) follows an industrial, independent study approach.

The mass-media approach relates to an institution's ability to rapidly share learning with a student audience through radio, television or the internet. The interaction in this model is one-way, with no means for students to engage with the lecturer. MOOCs exemplify this form of learning. Drawing on disruptive innovation theory, Rambe and Moeti describe how online learning through MOOCs contribute to the democratisation of higher education access; they also note the difficulties that vulnerable communities have to access such services.[29]

Finally, the small-scale model differs in its student engagement approach as it follows a targeted delivery approach or guided approach as described by Czerniewicz.[30] In this instance, the learning content is tailored based on the needs of the individual student. Thus, either the lecturer or tutor directly engages with the student. Each of these approaches varies in staff/student ratio and cost. From a pedagogical perspective, greater engagement is important. In this respect, there are educational benefits when applying the small-scale approach. As universities navigate the online learning transition, decisions must be made regarding their approach to online learning and which preferred or hybrid model to develop in their context.

Czerniewicz discusses the decision-making processes of universities when deciding to adopt online learning.[31] When resources are scarce, investing in new technologies and learning processes requires hard choices. Higher education institutions in developing and emerging countries also have to contend with a different scale of digital disparities than those in developed countries.[32] Thus, an inclusive transition to online learning in developing and emerging countries places an additional burden of infrastructure costs and digital skills training on the higher education institution, which institutions in the developed world do not have.

Where the higher education institution does not mitigate the online learning disparities, one finds that online learning only supports the needs of the privileged. As noted by Perozzi et al. and Schreiber et al., disparities have become shockingly evident during COVID-19 lockdown across the world, particularly in developing country contexts, as far as home environments that are conducive to online learning are concerned.[33,34] These disparities can be grouped into three domains: a personal domain, public domain and socio-cultural domain. The personal domain considers a student's identity, educational and experiential background, and access to resources, assets and equipment relevant to online learning. The public domain deals with access to basic government services and infrastructure and services provided by network industries, including electricity, clean water, transportation, health care, shelter and food, and internet access, all of which determine how conducive living conditions are for online learning. The socio-cultural domain finally accounts for students' interaction with family, community and society. It involves household and community level expectations on an individual like care duties, etc., that may make a home learning environment difficult to navigate. The campus environment can level the playing field for students across all three domains by means of a fourth domain, i.e. the higher education institution, student affairs and services domain. In a remote online learning

environment, disparities in the former three domains present the stark reality that determines who has access to remote online learning and who has not.[35,36] Thus, the basic infrastructure requirements essential for online learning (as grouped under the public domain) are assumed to exist in the developed world; hence, they mostly do not feature in the literature describing online learning or technology adoption. Meanwhile, they are critically important to ensure inclusive and effective online learning in developing country contexts.

In Ghana, Doe et al. contrast the success factors from the student and the institution's perspective.[37] Doe et al. note that the country's e-readiness and the country's digital infrastructure capabilities are overarching enablers for online learning.[38] From a national perspective, e-readiness must be considered with other factors such as the country's socio-economic and cultural contexts. If one assumes the national context is conducive to online learning, from the student's perspective the traditional factors of perceived usefulness, indispensability and user satisfaction also apply, as described by Taherdoost and in the Delone and McClean model.[39,40] At the institutional level, the university must consider national factors such as e-readiness, cultural fit, strategic fit and managerial innovativeness.

Beyond the basic infrastructural, household and individual student level determinants, there is a higher form of enablers involving knowledge, skills, and competencies that contribute to online learning adoption. Alhabeeb and Rowley describe the success factors for online learning in Saudi Arabia and highlight the importance of digital skills and the knowledge required to access, operate and derive meaning from online learning content.[41] The institution must also have clarity about how technology will enable learning and how effective communication and student engagement will be ensured. Lastly, Alhabeeb and Rowley note the importance of producing quality digital content, which requires that the lecturers have the necessary knowledge to externalise the lesson's content using the appropriate tool.[42] To ensure that quality content is disseminated via an institution's online learning platform, the content's quality must be assured, and the lecturer's digital proficiency must be verified.

According to Therborn and Czerniewicz, within the context of the massive inequalities pervasive in South Africa, for example, three types of inequality must be factored into the decision to go online: vital inequality, resource inequality and existential inequality experienced by staff and students.[43,44] Resource inequality relates to the infrastructural concerns raised by Alhabeeb and Rowley, Doe et al., Perozzi et al. and Schreiber et al.; it refers broadly to the financial, economic and cultural capitals of the student body.[45,46,47,48] It relates to electricity supply and availability, internet access and coverage, device ownerships and the cost of internet usage. Using Czerniewicz's terminology, vital inequality refers to the importance of education in redressing poverty and improving one's opportunities in life.[49] Existential inequality deals with issues of freedom, dignity, autonomy and self-development. This form of inequality emphasises the power dynamics in a higher education institution, highlighting the educators and students' agency in the decision-making process. Thus, power dynamics must also be addressed if an institution wishes to promote the adoption and buy-in to the process. The forceful introduction of a new medium is likely to be negatively received, resisted and rejected.

On the basis of this brief review of salient, recent literature from comparative, developing country contexts, we propose that the critical factors that inform successful online learning

adoption in African universities can be categorised from the perspectives of the affected stake-holders, viz. the institution, educators and students. Table 5.1 describes the core success factors that enable online learning in a developing environment from the perspectives of the institution, the educator and the student.

Table 5.1: Critical success factors for effective online learning from the perspective of the institution, educators and students

Perspective	Critical success factors
Institution	Socio-economic circumstances, cultural and wellbeing concerns of the student and academic body, readiness of the student and academic body, e-readiness (accessibility, availability)
Educator	Digital access, digital skills, opportunities for training, participation in decision-making processes
Student	Basic public and home infrastructure, socio-cultural home environment, digital access, cost of internet access, digital skills, access to training, participation in decision-making processes

African Universities' Experiences in Transitioning to Online Learning during the COVID-19 Lockdown

Institutional perspective

From the institutional perspective, African universities wished to 'save the 2020 academic year' and were forced to introduce emergency online teaching as a mode of instruction rapidly as the COVID-19 pandemic unfolded.[50] As Czerniewicz describes, universities can only adopt new technologies when they solve a problem, given the limited resources at their disposal.[51] In the context of forced social distancing and lockdown, African universities had to identify an appropriate learning model that adopts either an independent (so-called asynchronous) or guided (i.e. synchronous) study strategy. If the choice favours the independent study approach, the institution requires limited student/lecturer interaction. In contrast, the guided approach requires the institution to develop methods for their teaching staff to interact with their students via digital means.

In attempting to implement emergency online teaching practices, African universities were investigating their options to counter barriers such as poor internet connectivity, electricity interruptions and other infrastructural challenges. Partnerships with private service providers became a typical response in South Africa, Rwanda, Uganda, Ghana and Ethiopia. For example, universities such as UCT and UP in South Africa, Makerere in Uganda, Ashesi and KNUST in Ghana and UoG in Ethiopia entered into partnerships with local mobile network providers to 'zero-rate' a selection of educational websites and learning platforms, giving students data-free access and reduce their internet costs.[52,53,54,55,56,57,58,59] The act of zero-rating certain sites did not remove the cost of access, but instead, it transferred the cost from the user of a site to the university who partnered with the network provider. The zero-rated sites were mainly

university websites, their online learning portals, research services, and/or library portals in these countries. For example, UP developed its own Virtual Private Network (VPN) to control how students access these zero-rated sites and provided guidelines to students explaining how to enable data-free access.[60] In South Africa, to maintain contact during the pandemic, it was also reported that academic staff resorted to engaging students via social media using services such as WhatsApp, Twitter and Facebook.[61]

After reviewing the selected universities' efforts, these institutions found that radio and television access was not suitable for the independent study approach. The transition to emergency online teaching was also not initially supported in Uganda until July 2020. The government actively deterred some institutions from introducing an emergency online teaching programme.[62,63] In Uganda, it was noted that the radio and television signal coverage was not uniform across the country. Together with the challenges of intermittent electricity supply, this method of student engagement was not preferred.[64] Makerere partially transitioned to emergency online teaching with some programmes offered online.[65] The Ugandan government did not formally endorse an online learning programme in their universities until July 2020, after introducing a series of online learning regulations for universities. For example, it required that a university provide the Ministry of Education and Sport evidence of how students without internet access would be supported. Universities also needed to evaluate and accredit courses that would be delivered through an online means.[66] The Ugandan National Council of Higher Education is responsible for the accreditation of these courses.[67]

Electricity is a critical enabler of online learning across the continent and has been identified as a critical concern in South Africa, Kenya and Ethiopia. In Ethiopia, approximately 65 million of the 109 million citizens do not receive a consistent electricity supply, causing any dependence on scheduled online learning to be unreliable.[68] Similarly, in South Africa, rural areas have limited electricity supply. UP argues that the mobile phone prevalence provides an opportunity to offer access to emergency online teaching in areas where electricity supply is intermittent, as the student benefits from their device's battery.[69] Another counter-strategy to address a lack of electricity is in distributing learning materials in hard-copy format. UP and KNUST resorted to such distribution. In particular, KNUST relied on its regional learning centres to distribute such content to enable remote learning.[70]

To allow the staff and students to engage online, several of the universities in our study introduced university platforms to centralise online lectures, access to resources and communication between student and academic staff members. Makerere introduced the Makerere University eLearning Environment (MUeLE) before the lockdown and found it easy to transition to this platform for students with internet connectivity.[71] Ashesi, in contrast, adopted three separate platforms to support lecture streaming, document management and teleconferencing.[72] In Ghana, the university platforms are not as advanced but have successfully accommodated online registration. Online registration has not been as popular in the past, with many students opting to register in person. This trend was forced to stop for the new semester in 2020; it may, however, limit the enrolment opportunities for students without internet connectivity.[73]

At KNUST, Tawiah et al. found a disconnect in the institution's understanding of their preparedness for emergency online teaching whereby 84 per cent of education managers felt they

were not ready for the change.[74] In comparison, 63 per cent of IT managers were familiar with the online learning policy and available facilities on offer. According to Dell, in Rwanda, the universities range between different levels of preparedness, limiting their ability to introduce policies in favour of online learning.[75] In Ethiopia, the policy to transition to an online form of learning was staggered, with only the third year and postgraduate students adopting emergency online teaching. Meanwhile, the country's challenges with electricity supply, internet connectivity and the high cost of internet access remained a barrier.[76]

Table 5.2 summarises the key concerns to be considered by the institution:

Table 5.2: Summary of factors considered by the institution

	Status of emergency online teaching adoption	Socio-economic, cultural and wellbeing concerns	Digital infrastructure and affordability concerns
AIMS	Adopted online instruction Research also conducted online	Supports a comparatively smaller group of students, all of which are postgraduate Preference is given to students from disadvantaged backgrounds during the registration process	All students are recipients of bursaries which include a stipend. Bursaries typically also include a device (e.g. laptop) It is the student's prerogative to spend funds on internet access
Makerere	Partial transition to emergency online teaching. The Ugandan state did not support a transition to online learning until July 2020. The university had to indicate to the education ministry how it would support students without internet connectivity	Online learning not widespread due to technology limitations and issues of inclusion/exclusion. There is a recognition of the need to promote online learning	Inadequate electricity supply, coverage and connectivity in rural areas. Limitations in radio and television Limited device ownership Cellular providers zero-rated education resources Negotiated the subsidised purchase of devices from tech giants
Ashesi	The semester has been divided into two halves for those that have internet access and those that do not	Institutions dependent on fees may struggle to remain financially viable There is a programme to offer counselling, coaching and academic advice to assist students dealing with mental health challenges	Inadequate electricity supply, coverage and connectivity in rural areas Limited device ownership. Cellular providers zero-rated education resources. Ashesi's learning management system was zero-rated by all major internet service providers Provides 10GB monthly data to students. Attempting to provide devices to those without

	Status of emergency online teaching adoption	Socio-economic, cultural and wellbeing concerns	Digital infrastructure and affordability concerns
KNUST	Adopted a mixed approach with online and hardcopy-based learning	Nearly 50 per cent of the country has no internet connectivity. There is a disjuncture in understanding their digital capabilities. There are inadequate organisational capacities to accommodate a transition to emergency online teaching	Inadequate electricity supply, coverage and connectivity in rural areas Limited device ownership Cellular providers zero-rated education resources. Many have outdated devices
UCT	Moved online. UCT has many years of experience in operating an online learning platform used for blended learning delivery	University surveys suggested that 89 per cent of students had internet connectivity Most UCT students come from comparatively privileged backgrounds. Students with mental health concerns were receiving extra concessions with deadlines	Some students experienced reduced connectivity in rural areas Once-off provision of 40GB data. Cellular providers zero-rated education resources Devices were provided on a loan basis to a small minority of students who do not have their own devices
UP	Moved online. UP is well experienced in operating an online learning platform that was used for blended learning delivery	The crisis centralised the discussion regarding the digital divide. The institution believes it had been relatively well prepared to adopt full-on online learning	Some students experienced reduced connectivity in rural areas Was a once-off provision of 20GB data Cellular providers zero-rated education resources Devices were provided on a loan basis or through National Student Financial Aid Scheme (NSFAS). Mobile phone access is viewed as an option to counter challenges in electricity supply
UoG	Adopted online learning for 3rd year and postgraduate students only	The country, in general, suffers from poor internet connectivity and high internet costs, disadvantaging many Ethiopians and leading to difficulties in online adoption. Approximately 65 million people do not have a stable source of electricity in the country	Inadequate electricity supply, coverage and connectivity in rural areas Limited device ownership. Cellular providers zero-rated education resources Students in receipt of scholarships received an additional stipend to support their online education

Student perspective

From the student's perspective, online learning's key enablers are internet connectivity, device ownership, data affordability and electricity supply. The internet connectivity issues are three-pronged and relate to the cellular signal coverage, the strength of the internet connection and the cost of use. These issues are common across all the selected countries. In South Africa, internet and cellular coverage are typically poor in relatively remote rural areas. Due to the lockdown, many students who would traditionally live in university residences had to return home to rural areas where they struggled to engage in online learning effectively due to limited coverage.[77] In Ghana, it was noted that less than half of the population, approximately 19 million of the 45 million people in the country, had broadband access. Given that the majority lack connectivity, the University of Ghana, for example, introduced a regulation banning the hosting of online real-time assessments.[78]

At Ashesi, the institution divided the semester into two halves, with the first half dedicated to students with internet access and the second half for the disconnected students. Effectively, this approach denied offline students learning opportunities for half of the semester.[79] At KNUST, students without connectivity, were given the option to relocate back to the university campus after 15 June 2020 to benefit from the university's internet facilities.[80] At UCT, the institution surveyed its students and found that only 8.6 per cent of their students did not have internet access. The comparatively lower percentage supported the university's decision to transition entirely to online learning.[81]

Digital device ownership is a crucial enabler for students, which refers to mobile phones, tablets, laptops and desktop computers. Some universities opted to provide students with a device through a loan scheme or through a state funding agency such as South Africa's NSFAS. Due to lockdown-related travel restrictions, the universities were tasked to deliver these items individually to students (e.g. by courier). Some universities such as the UCT, Ashesi, and UP reported delays.[82,83,84,85,86] At KNUST, it was also noted that many students operate older devices with outdated software that the software vendor no longer supports.[87] At Makerere, the Vice-Chancellor, negotiated with technology giants such as Microsoft, Dell and Google to secure subsidised computers for students.[88]

In the instances where a student has internet and device access, the high cost of data consumption is a further barrier impeding their online education. As noted in Table 5.2, students from the selected universities benefited from zero-rated education resources such as university websites, online libraries, learning platforms and other sites to access learning materials.[89,90,91,92,93,94,95] Further efforts made at institutions such as Ashesi, UCT and UP involved the provision of free data bundles ranging from 20GB to 40GB, either as a once-off benefit or in monthly instalments.[96,97] UP provided a 20 GB data bundle comprised of a 10GB daytime and 10GB night-time bundle, which required the student to be active online after midnight to maximise its usage.[98]

Table 5.3 summarises the critical success factors from the student's perspective, other than those related to digital infrastructure and cost concerns (which are discussed above), focusing on digital skills and training opportunities and student participation in decision-making.

Table 5.3: Summary of factors considered by the student

	Digital skills & training opportunities	Participation in decision-making
AIMS	There was no specific digital skills training provision recorded as a COVID-19 response (initiated by AIMS-SA)	No information reported
Makerere	The ICT directorate provided technical support to students Online training pre-COVID-19 was provided via the MUeLE system in how to navigate, retrieve content and communicate	The university's decision-making process is described as hierarchical, with minimal inputs received from the student body (student guild) or the academic staff body on the matter
Ashesi	Introduced mini-lectures as a proof of concept In recognising difficulties in online access, the university recommended students defer courses to a later point. No additional training was offered via the Ashesi COVID-19 portal	An education collaborative was convened to discuss the future of learning, but it excluded student views
KNUST	Student skills were recognised as limited, despite the institution's support	National Union of Ghana Students called for a stop to online learning as it disadvantages offline students
UCT	No specific training was offered to students (over and above standard introduction to online learning). The Centre for Innovation in Learning and Teaching (CILT) was available for assistance	The UCT COVID-19 task teams for online learning and research included representation of academic staff and students The South African Union of Students (SAUS) unsuccessfully called on the government to halt the universities' online learning programme until the digital divide has been addressed
UP	Provided a user guide on how to operate the UP VPN platform to ensure access to zero-rated content UP Library provided support to staff and student to access learning content. The Department for Education Innovation prepared training content and had faculty student advisors to assist students access content and interact online	The UP Students' Representative Council (SRC) complained about the lack of consultation in adopting online learning
UoG	There is a recognition of the different levels of ability among students. Some are more capable, but it should not be assumed that all operate at the same level of proficiency	No information reported

Educator perspective

From the educator's perspective, key considerations beyond the infrastructural and cost-related concerns are educators' levels of digital skills, opportunities to improve their skills to deliver lessons online effectively and their involvement in the decision-making process. In Uganda, one of the barriers to rolling out an emergency online teaching programme was that the academic staff's digital skills were inadequate to produce digital learning materials, effectively deliver lessons online, and interact meaningfully with students.[99] To assist in this area, Makerere offered training to staff used the video-conferencing platform Zoom and other student engagement tools. Although this form of teaching was intended to be an emergency measure, the Uganda

National Council of Higher Education also required the university to provide evidence that the staff were qualified to conduct online learning. However, the nature of the evidence to satisfy this regulation is unclear.[100] The MUeLE also provided access to training workshops and previously prepared training content for students and lecturers.[101] In Ethiopia, it was reported that generally, online teacher training had been overlooked, and lecturers required guidance in utilising the online learning tools appropriately. Among the students, some were comparatively better prepared for online learning. However, as many did not have access to basic ICT equipment or connectivity, there were varying levels of access and digital skills.[102]

In Ashesi and KNUST in Ghana, the IT department was prepped to assist academic staff with their online instruction.[103,104] KNUST also held a webinar to guide the staff on how to approach online learning in preparation for their move online.[105] At UCT, the university's CILT was responsible for guiding the university in developing digital content and course work.[106] Like CILT at UCT, UP's Department for Education Innovation produced a range of resources to assist students and staff in engaging online using their online learning platforms. The university also introduced an artificial intelligence application to monitor the students' performance and identify students who required one-on-one assistance.[107]

When planning the transition to online learning, the pedagogical concerns pertaining to educator-student interaction and content design must be centred. In South Africa, an alliance of academics raised these concerns and called for these pedagogical concerns to be recognised as the central issue when deciding to opt for online learning. In their view, consultation with the academic staff was inadequate. The alliance called for further dialogue with academics and students. They also argued for adopting supportive, structured and flexible teaching strategies when designing an online learning transition.[108] The students in Ghana and South Africa shared similar views about consultation, with the National Union of Ghana Students and the SAUS calling for online learning to be stopped until the digital divide among students were addressed.[109,110,111] In Uganda, Makerere was previously described as a hierarchical institution with minimal consultation when making decisions.[112] It is unclear if these traits affected decisions made in response to the 2020 pandemic. In Ghana, Ashesi was lauded for convening a broad education collaborative engagement bringing together stakeholders from across the Ghanaian education system to discuss the future of learning. However, this engagement excluded inputs from students.[113]

For a transition to effective online learning, a dialogue among all university community representatives, including university leadership, academic staff, and students, needs to be initiated and sustained. Such dialogue is necessary to develop appropriate emergency measures and because emergency measures introduced during the pandemic can often become medium-term policy approaches.[114] Inputs from staff and students are needed to ensure policies are adopted that meet the conditions and needs of the staff and student bodies. Table 5.4 summarises the experiences of educators from the sample of universities.

Table 5.4: Summary of factors considered by the educator

	Digital skills & training opportunities	**Participation in decision-making**
AIMS	There was no provision of training recorded in the COVID-19 responses initiated by AIMS-SA	AIMS endeavours to include African experts in all governance structures to ensure that the local context is understood during decision-making
Makerere	There was a concern that educator skills levels were inadequate They provided some training in Zoom and the use of the MUeLE platform The regulations required that the university must provide evidence that the staff responsible for online learning were qualified ICT directorate provided technical support to staff	University was to reopen on 15 June 2020 after consulting academics. The Ministry of Education and Sport decided to opt for online learning at a national level
Ashesi	IT Office provided assistance	They convened a virtual Education Collaborative, bringing together education stakeholders from across the country to discuss the future of learning
KNUST	A technical call centre was set up to assist the staff The university held a webinar in May to guide staff in how to apply online learning techniques	No information reported
UCT	CITL was responsible for guiding the development of online content	The UCT COVID-19 task teams for online learning and research included representation of academic staff and students The Post School Education Alliance called for greater dialogue and the centralisation of pedagogical concerns
UP	UP Library provided support to staff and student to access learning content. The UP Department for Education Innovation produced preparatory videos to assist staff	No information reported
UoG	Teacher training had been overlooked, and teachers needed assistance to operate the platform and produce relevant content	No information reported

Learnings from the Adoption of Emergency Remote Teaching in African Universities

A central concern in online learning adoption in the African context is the fear that it will exacerbate educational inequality due to the rich/poor and centre/periphery digital divide. Strategies that promote inclusivity are needed from the outset when designing the online learning transition. Unfortunately, in the rush to save the academic year from the pandemic and lockdown impact, those without internet connectivity and digital skills challenges were

marginalised. If a digitisation of teaching is inevitable, there is a need to introduce conditions to equalise education opportunities before commencing the teaching programme. In the context of COVID-19, the principal argument for the rapid transition to online learning was the need to keep pace with the academic calendar.[115] Universities that made efforts to provide a suitable device, zero-rated online learning resources, or provided data bundles to students, attempted to address the digital divide at the student's level. However, this support could not make up for other disparities in the home learning environment – in the personal, socio-cultural and public domains of the learning environment – that are under normal circumstances remedied to some extent through campus-based services.[116,117] Furthermore, even where students were provided with devices, data and data-free access, the reported delays in accessing the data bundles or the loan device still meant that there were 'offline students' who had fewer opportunities to access education compared to more privileged students. A way of ensuring inclusive online learning for students who experienced insurmountable challenges with off-campus/home-based online learning was therefore to prioritise their return to campus so as to be able to have conditions conducive to learning and access to the resources and services they needed to be able to participate successfully in online learning. This had been an argument in discussions regarding students' staggered return to campus as lockdown levels eased in the South African context.[118]

In more equal societies such as Australia, Dodo-balu describes how online learning can act as an enabler for greater educational access and as a proponent of social justice.[119] In that context, access to online learning is more uniform across the student population, and Dodo-balu argues that online learning foregrounds fairness and inclusion issues.[120] However, in more unequal contexts, dependence on online learning can amplify inequalities as experienced in Indian universities.[121] In adopting an online learning strategy, it must be determined if all students can engage in their studies adequately and equitably. Where disparities emerge, the institution must address the problem and ensure all students can perform on a level playing field.[122]

Mandal describes how well-funded Indian universities are better prepared to introduce digital platforms and online learning, while other universities have struggled to progress through the curriculum.[123] Similarly, in South Africa, academics have highlighted how the rapid online learning transition reduced students' academic freedoms. However, given the context of the pandemic, the options for learning are limited. Due to the emergency powers afforded to governments, online learning can be legally introduced if the action can be considered as 'reasonable, proportionate and within the law'.[124]

More effort is also needed to address the disparities in the digital skills of academic staff and students. None of the reviewed institutions had promoted digital skills training on a scale comparable to what was achieved in Chinese universities, where training was mandated before online classes started.[125] Notable efforts to bridge the gaps in digital skills proficiency were found in the UCT. They depended on CILT to guide the institution in preparing for online teaching.[126] KNUST provided call centres using their existing IT departments to offer such services to students and educators, while Ashesi offered such services only to the staff.[127,128,129] The Ugandan government also proposed introducing a verification process to ensure that academic staff were accredited and that the produced online content was adequate.[130]

Behari-Leak and Ganas describe the need to develop tailored teaching strategies using technologies and other resources at one's disposal to develop an effective learning strategy.[131] The mass-media and industrial approaches to online learning, described by Depover and Orivel, in effect, promote exclusion, if not coupled with strategies that facilitate online learning access.[132] The medium also limits teacher-student interaction which restricts effective teaching and knowledge transfer. Thus, the small-scale approach referred to by Depover and Orivel (or a hybrid version with elements of a small-scale approach) is preferable as it promotes interaction, and depending on how the approach is implemented could reduce the cost of education. This view is supported by the Brookings Institute, which recommends that online learning practices endeavour to promote two-way engagement between student and staff members.[133] Digital tools could also facilitate such communication in the form of text messaging, if necessary.

A key element of promoting an inclusive and responsive, socially just higher education system is to harness students and educators' agency, particularly in the process of decision-making. For students and educators to realise their goals in the university system, they require a level of agency to enact such changes.[134] In this respect, Schreiber describes the importance of participatory parity to advance students' contributions in the education system, noting that there is a need to create opportunities for all members of the education system to participate in the decision-making processes more equitably.[135,136,137] From the few examples highlighted in the preceding section, students and educators have called for more debate and opportunities to contribute to the decision-making process in South Africa, Ghana and Uganda.[138,139,140] The national student unions, in particular, focused their attention on the inequities in access involved in remote online learning, which denied learning opportunities to disadvantaged students.

An innovative approach that advances equality of access to education was taken by UP, which introduced a mobile application to promote learning via a mobile device.[141] The rationale for the application was to provide access to learning in areas where the electricity supply is unreliable. Another example from Rwanda followed the important role that centralised online learning platforms play to enable students to engage their lecturers and academic staff. To this end, the Rwandan Education Board produced a centralised online platform to be shared by universities to create lessons, distribute learning materials and register students.[142] The benefit of this approach was that it saved each university from investing in developing its own platform or purchasing costly licenses to use existing platforms.[143] The disadvantage was that the university was unable to customise the platform based on its needs.

UNISA, which is the oldest dedicated distance learning university globally and the largest mega-university in Africa, supports a large percentage of the South African student population. Its distance learning model is not dependent on online learning but rather on distributing hardcopy learning materials through the postal services.[144] KNUST followed a similar approach to distributing learning materials through their network of regional learning centres.[145] In this instance, the physical infrastructure and personnel resources play a crucial role in connecting offline students to the study coordinator.

Conclusion

The first objective of this paper was to describe the response of African universities to COVID-19 mandated lockdowns. We have noted that universities with established digital infrastructure and adoption initiated and continued with emergency remote teaching across the institutions during 2020. Other universities attempted online learning on a smaller scale with limited success. When instituting emergency protocols, we caution universities against allowing these protocols to become a new norm, given how these emergency measures have unequally affected the university community. In the medium-to-long term, a successful transition online will require African universities to develop a comprehensive online learning plan.

A comprehensive online learning transition plan must define the chosen online learning model, be it the industrial, mass-media or small-scale model referred to by Depover and Orivel.[146] This study has found that the industrial and mass-media models applied during emergency remote teaching are suited to independent study and limit interaction between students and staff members. In contrast, the small-scale model supports teaching in smaller numbers by integrating teaching assistants or tutors. With greater engagement, the small-scale model can bridge the gap between guided and independent learning models described by Czerniewicz.[147] However, managing the medium of contact between staff and students is essential. To maximise engagement and online lesson quality, following this paper's second objective, Table 5.1 summarises the key success factors that need to be integrated into an online learning transition plan. These factors provide important considerations from the institution, staff member and student's perspective.

Our third objective was to examine the impact of emergency remote teaching methods on the university community and whether these modalities contributed to inequality in any form. The decision to go online was largely dependent on whether the institution would reach the majority of students. This approach, however, effectively marginalises students from lower-income backgrounds and students that have to contend with various personal, socio-cultural and public domain challenges.[148] As Behari-Leak and Ganas state, when designing an inclusive online learning programme, one should tailor the programme's design to the needs of the class.[149] A one-size-fits-all approach will result in the marginalisation of some students. One must consider the socio-economic cost of a decision that marginalises certain students. Students who were unable to participate in the academic year will be forced to withdraw from such programmes, leading to higher levels of dropouts with all the household-level hardships and social ills this brings.

In contrast, an inclusive approach to designing a university's effective online learning model will make the university community more resilient to crises such as the COVID-19 pandemic in the long term. A tailored approach that recognises staff and students' circumstances will promote staff and student interaction, improve how the staff members design the teaching programme, and how students can access and participate in learning. Thus, in response to this study's final objective, regarding the long-term benefits from an investment in digital infrastructure, we find it is essential that the institution invests in accessing online learning and pays attention to the teaching programme's design. An effectively designed online learning model will ensure that interaction and participation are maximised to promote the lesson design's pedagogical quality.

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