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Emerging online pedagogical needs of university lecturers in the wake of the Covid-19 pandemic: The voices from Zimbabwe

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ABSTRACT

This qualitative multiple case study was undertaken to establish the online pedagogical needs of university lecturers following the sudden Covid-19 induced transition from face-to-face to online teaching and learning. From a population of 25 universities, a purposive sample of two universities and 16 lecturers was studied in-depth. Data was generated through in-depth interviews and Focus Group Interviews and analysed thematically. Theoretically, the study employed van Dijk's (2005) Resources and Appropriation Theory (RAT). The abrupt shift to online pedagogy created online pedagogical skills vacuum that undermined the effective implementation of online teaching and learning. Most lecturers found themselves incapacitated to facilitate online teaching and learning without training in online pedagogy. They also failed to effectively implement online pedagogy due to limited or no access to digital devices, internet connectivity challenges, incessant electricity load shedding, and high data bundle tariffs. The principal emerging pedagogical needs of lecturers are digital resources and online pedagogy.

KEYWORDS:
Online pedagogy; Online pedagogical needs; Covid-19 pandemic; Digital skills; University lecturers

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1. Introduction

The outbreak of Covid-19 in Wuhan city of China in the latter part of December 2019, created a health crisis that severely disrupted the provision of education in many countries across the world. In a short time, the virus had spread to other countries. The World Health Organisation (WHO) declared the Covid-19 a global pandemic on 11 March 2020 (WHO, 2020). In response, many governments, in conjunction with the WHO, implemented measures to contain the spread of the pandemic. The measures included national lockdowns, travel restrictions, the closure of educational institutions, social distancing, hand washing, banning public gatherings, and wearing face masks (WHO, 2020). The closure of educational institutions plunged the world into an unprecedented education crisis that interrupted educational provision for billions of students. By mid-April 2020, 94 % of the world's student population was not attending school due to the Covid-19 induced closure of educational institutions (UNESCO, 2020). This figure includes 297 million students across the African continent and 4.13 million in Zimbabwe (Afrobarometer, 2020). The pandemic disrupted the provision of education on a global scale, denying many students their inalienable right to education.

Before the outbreak of the Covid-19 pandemic, the predominant mode of instruction in many Higher and Tertiary Education Institutions (HTEIs) in the African continent was face-to-face teaching (Adarkwah, 2021; Agyapong, Asare, Essah, Heady & Munday, 2020; African Union, 2020). The Covid-19 health protocols that were put in place to contain the spread of the pandemic particularly national lockdowns, travel restrictions, closure of educational institutions, and social distancing rendered the regular face-to-face mode of teaching and learning not only unfeasible but also unlawful (Demuyakor, 2020). Many governments across the globe had no option but to rethink alternative instructional modes to ensure the continuity of the teaching and learning processes amid the Covid-19 pandemic.

To abide by the Covid-19 health protocols and reduce the spread of the pandemic, several HTEIs in Africa and other continents immediately suspended face-to-face classes and shifted to online teaching and learning (Association for the Development of Education in Africa [ADEA], 2020; eLearning Africa, 2020; IAU, 2020; WHO, 2020). Similarly, the Government of Zimbabwe (GoZ) directed all HTEIs in the country to close on 24 March 2021, and proceed with the teaching and learning processes online (Mukeredzi, 2020). In essence, the

Covid-19 pandemic triggered renewed interest in the integration ICTs into education in several African countries (Adarkwah, 2021) including Zimbabwe. Subsequently, online teaching and learning has become the 'new normal' in this Covid-19 era.

Existing literature (ADEA, 2020; eLearning Africa, 2020; IAU, 2020) indicates that more HTEIs in Europe than Africa were able to immediately shift to online teaching and learning. A survey by the IAU (2020) reveals that by May 2020, only 29% of HTEIs in Africa had shifted teaching and learning to online platforms compared to 85 % in Europe. The same survey further reports that two-thirds of HTEIs in Africa failed to migrate to online teaching and learning platforms and suspended lessons (IAU, 2020). These statistics lay bare the enormity of the digital divide gap between HTEIs in developed and developing countries. The statistics also point to the existence of factors that stalled the transition to online teaching and learning by some HTEIs in Africa during the Covid-19 pandemic. These factors constitute the online pedagogical needs of lecturers.

During the Covid-19 pandemic, several barriers stalled the transition to online teaching and learning by many HTEIs across the African continent. One of the barriers was lack of digital devices such as laptops, desktops, and smartphones by tertiary students to access online teaching and learning platforms. According to UNESCO (2020), online teaching and learning was a serious challenge in Sub-Saharan Africa where 89% of students do not have access to digital devices. The same challenge was noted in studies conducted in Ghana (Adarkwah, 2020), Kenya (Ngari & Ndung'u, 2020), Ethiopia (Mengistie, 2020), and Zimbabwe (Taru, 2020). Students cannot access learning material and lessons on online platforms without digital devices.

In several African countries students also failed to access online classes due to the high cost of data bundles. This was reported from many African countries including Nigeria (Abdullahi, Sirajo, Saidu, & Bello, 2020); Ethiopia (Mengistie, 2020); Namibia (Kaisara & Bwalya, 2020); and Zimbabwe (Taru, 2020). When students fail to access online teaching and learning platforms, they miss concepts and their academic achievement is compromised. A UNESCO (2020) report indicates that 82% of students in Sub-Saharan Africa do not have access to the internet because of pricey data bundles, weak network signals, and poor network coverage. In Zimbabwe, students residing in remote areas where internet connectivity is poor or unavailable found it difficult to access online teaching and learning platforms (Taru, 2020). Therefore, internet accessibility

challenges impeded the successful implementation of online teaching and learning in HTEIs in Africa amid the Covid-19 pandemic.

Access to electricity for powering digital devices is a basic requirement for one to participate in online teaching and learning. In many parts of Africa, particularly rural areas, there is no electricity to enable students to access online platforms (eLearning Africa, 2020). In urban areas where access to electricity is generally available, many students had challenges in accessing online platforms because of load shedding. The lack of consistent power supply due to load shedding made it difficult for tertiary students in Zimbabwe (Taru, 2020), Eswatini (Gurajena, Mbunge, & Fashoto, 2021), Zambia (Sintema & Singogo, 2021), and many other parts of Africa to access instruction delivered online. Incessant load shedding reduced the amount of time that students accessed content and instruction on online teaching and learning platforms.

From the onset of the Covid-19 induced shift to online teaching and learning, much of the public debate and scholarly research generally focused on the challenges posed by the abrupt transition to online pedagogy in the context of students (Kaisara & Bwalya, 2020; Taru, 2020). This has created a knowledge gap on the online pedagogical needs of lecturers who are the main implementers of online pedagogy. It is this knowledge gap that prompted the researchers to grapple with the main research question, "What were the emerging online pedagogical needs of university lecturers during the implementation of the Covid-19 induced online teaching and learning?"

The outbreak of the Covid-19 pandemic reconfigured the provision of higher and tertiary education from face-to-face to online teaching and learning in many African countries and Zimbabwe was no exception. The GoZ directed all HTEIs to close on 24 March 2021 and proceed with the teaching and learning processes online (Mukeredzi, 2020). Before the outbreak of the Covid-19 pandemic, the predominant mode of instruction in the majority of universities in Zimbabwe was face-to-face teaching and learning (Moyo, 2020). The abrupt transition to online pedagogy raises concerns about university lecturers' preparedness to teach online. Therefore, the study, sought to address the following research questions:

i) ***What are the digital resource needs of lecturers when facilitating online learning?***
ii) ***What are the digital skills needs of lecturers during the implementation of online teaching and learning?***
iii) ***What is the nature of online usage gaps that lecturers encounter when implementing online teaching and learning?***
iv) ***How can the online pedagogical needs of university lecturers be addressed?***

2. Literature review

This study is guided by van Dijk's (2005) Resources and Appropriation Theory (RAT). At the core of the RAT is access to digital technology. The term access entails the total process of appropriating and utilising digital technology (van Dijk, 2005) in teaching and learning situations. The same author identifies three successive kinds of access to digital technology namely physical access, digital skills access, and usage access. These forms of access facilitate the appropriation and utilisation of online teaching and learning platforms by educators. The deficiencies in one or more of these modes of access can create digital technology access gaps that the study regards as online pedagogical needs.

Physical access entails access or ownership of digital technology (van Dijk, 2005). Educators should own or access digital devices to enable them to embrace and utilise online teaching and learning. The typical digital devices include desktop and laptop computers, tablets, and smartphones. Additionally, one needs material resources to keep utilising digital technology. The material resources include peripheral equipment like printers and scanners, software, ink, paper, subscriptions, source of power, and internet connectivity (van Dijk, 2012). By implication, one requires financial capital to own or access digital technology. Therefore, financial constraints can create physical access gaps that militate against the adoption and implementation of online teaching and learning by educators.

When people have obtained physical access, they need digital skills to command and utilise digital technology (van Dijk, 2017) in educational settings. These are online pedagogical skills that educators require to conduct online lessons. There are two basic categories of digital skills namely operational skills and substantial skills. To van Dijk (2005), operational skills involve the ability to operate and navigate digital devices. Substantial skills relate to information retrieval, content creation, and communication of digital information. The more substantial skills one possesses, the more one can make appropriate use of digital technology (van Dijk, 2012) in teaching and learning contexts. The implication here is that limited substantial skills can make it difficult for lecturers to effectively utilise digital technology in teaching and learning situations.

After obtaining physical and digital access, usage access follows in line. Usage access concerns the extent of digital technology usage as well as the diversity of digital devices and applications that one utilises (van Dijk, 2005; van Dijk, 2012).

The challenges that the lecturers encountered in utilising digital devices and platforms constitute online usage gaps and in turn online pedagogical needs. Usage access depends on physical access and one's repertoire of digital skills (van Dijk, 2012). This means that there is a close relationship among physical access, digital skills, and usage access. It is for this reason that the RAT was deemed the most appropriate theoretical framework for establishing a holistic picture of the online pedagogical needs of lecturers.

Online teaching and learning

Regmi and Jones (2020) define online teaching and learning as a technique of instruction and knowledge acquisition mediated through digital devices and the internet. It entails a mode of instruction that is delivered via digital devices and virtual platforms. The two basic categories of online teaching and learning are synchronous and asynchronous. Clark and Mayer (2016) state that synchronous online teaching and learning occurs in real-time with an educator. It is a form of online pedagogy involving streaming live lessons, video conferencing, webinars, and other virtual interactive teaching and learning activities. Asynchronous online teaching and learning occurs online through prepared teaching and learning materials without real-time educator-led instruction (Clark & Mayer, 2016). The educator uploads teaching and learning materials online for students to access during different times and from various locations. This study was concerned about the synchronous and asynchronous online pedagogical needs of lecturers.

Integration of Information and Communication Technologies into Zimbabwe's education sector

Since the year 2000, the GoZ has been making efforts to integrate Information and Communication Technologies (ICTs) into her education system. In 1998, the then president Robert Mugabe established the Presidential Commission of Enquiry into Education and Training (PCIET) to investigate the relevance of the country's education system. The commission presented a report of its findings in 1999. Among other findings, the commission reported that the country's education system was ICT deficient and recommended the use of computers for teaching and learning (PCIET, 1999). In response, the government launched the Presidential Computerisation Programme (PCP) in 2000 to provide schools and universities with computers. Under the PCP, the government donated over

7300 computers and computer-related equipment to schools and universities between 2004 and 2005 (Zengeya, 2008). This move enabled many schools and universities to utilise ICTs in the teaching and learning processes.

In 2005, the GoZ commissioned a Harvard University-guided e-readiness survey to assess the country's e-readiness to embrace ICTs in all the sectors of the economy. The survey revealed that the country was not uniformly e-ready (Isaacs, 2007). To stimulate the integration of ICTs into education and other sectors of the economy, the government adopted a National Information and Communication Technology (ICT) Policy in 2005 that was informed by the survey. The policy advocates the pedagogical use of ICTs in educational institutions and aims at accelerating national development through the utilisation of ICTs in all the sectors of the economy (GoZ, 2005). The National ICT Policy was reviewed in 2016 with a renewed mission of exploiting the potential of ICTs for sustainable socio-economic development in Zimbabwe (GoZ, 2016). Recently, the GoZ launched the National Development Strategy 1 (NDS1) 2021-2025. One of the aims of the NDS1 is to modernise the economy through digital technology (GoZ, 2020). It is evident from these policies that the GoZ has identified digital technology as one of the determinants of its national development agenda. However, it may not be possible to achieve national development through digital technology when lecturers who are the chief developers of human capital are not conversant with online pedagogy. It became imperative for the researchers to establish the online pedagogical needs of university lecturers so that they are addressed.

3. Methodology

The qualitative research approach which emphasises an in-depth understanding of social reality from the perspectives of research participants (Taylor, Bogdan, & DeVault, 2016) was adopted to address the research questions. In line with this approach, the researchers generated data for the study from lecturers who were directly involved in implementing online teaching and learning following the closure of universities due to the Covid-19 pandemic. From a target population of 25 universities in Zimbabwe, a purposive sample of two state universities and 16 lecturers (eight lecturers from each state university) was selected for the study. When a researcher studies at least two cases in a single study, it becomes a multiple case study. The more cases are included in a study, the greater the variation across the cases, and the more compelling are

the research findings (Stake, 2010). The multiple case study design enabled the researchers to generate a holistic picture of the online pedagogical needs of the lecturers.

The study was undertaken in October 2021 when the GoZ had eased the Covid-19 restrictive measures from Level 4 to 2. Hence, it was feasible to generate data through in-depth interviews and FGIs. To ensure safety and that of the research participants the Covid-19 health protocols of wearing face masks, hand sanitising, and social distancing were adhered to throughout the interviews. In-depth interviews which involve open-ended questions that enable respondents to express in detail and their own words how they conceive their world and make sense of it (Johnson & Christensen, 2014) were held with six lecturers (three lecturers from each university). The open-ended questions allowed the lecturers to express in detail their online pedagogical needs. In-depth interviewing also makes it possible for the researcher to probe respondents for greater clarity and depth (Johnson & Christensen, 2014). As a result, extensive and rich data on the online pedagogical needs of lecturers was generated

The study comprised two focus groups, that is, one focus group per university comprising five lecturers. FGIs generate a wider range of responses than individual interviews (Johnson & Christensen, 2014), resulting in richer and holistic data on the online pedagogical needs of lecturers. During the FGIs, it was noted that the contributions by some discussants stimulated other discussants to participate, resulting in heated debates. The discussants triggered one another's memory of specific events and facts (Taylor et al., 2016) on the online pedagogical needs of lecturers. They also elaborated on each other's views and in some cases, corrected each other. Consequently, detailed data was generated on the online pedagogical needs of the lecturers.

Data generated from in-depth interviews and FGIs was analysed using the Thematic Analysis (TA) procedure developed by Braun and Clarke in 2006. It is a data analysis procedure that focuses on identifying emerging themes or patterns of meanings across a data set (Braun & Clarke, 2006). In identifying the emerging and recurring themes for this study, the stages of TA as outlined by Braun and Clarke (2006) were followed. The researchers immersed themselves into the data by reading through transcripts several times, generating codes and reviewing them, coding the data, developing themes and sub-themes, as well as reviewing the themes and sub-themes.

Before commencing the interviews, research participants were informed about the nature, purpose, risks, and benefits of the study. The researchers also emphasised that participation was voluntary, and the research participants were free to withdraw from the study at any point. All the participants voluntarily completed and signed informed consent agreement forms. To maintain privacy, anonymity, and confidentiality the names of the research participants and those of the selected universities were not disclosed in this research report.

4. Results

The data generated from in-depth interviews and FGIs were synthesised and discussed under the following emerging themes digital resource needs; digital skill needs; and online usage gaps.

Digital resource needs

This section presents and discusses the findings generated from the responses of the research participants to the first research question: What are the digital resource needs of lecturers when facilitating online learning?

Laptop and desktop computers

Although online pedagogy thrives on the availability of digital resources, the lecturers were not provided with laptops and desktops. The findings indicate that the universities are financially incapacitated to provide lecturers with laptop and desktop computers. In the words of one lecturer "*Very few lecturers have laptops to access the Google Classroom platform…the university cited financial constraints for failing to provide lecturers with laptops*." An acute shortage of desktop computers in the universities also made it extremely difficult for lecturers to implement online teaching and learning. This came to light when the lecturers revealed that at both universities, there was only one desktop computer in each department that is used by the departmental chairperson for administrative purposes.

Many universities in Africa are still faced with the challenge of the lack of digital devices by lecturers and students to go online (Muftahu, 2020). A survey of 52 countries conducted by eLearning Africa (2020) reports that the majority of educators in Africa were not provided with financial support to procure digital

devices for them to continue with the teaching and learning processes online during the COVID-19 pandemic. The lack of financial support hindered several lecturers from moving their courses to online platforms. Mogaji and Varsha (2020) argue that public universities in developing countries have grown more rapidly than governments' capacity to fund the institutions. This has resulted in underfunding and the inadequacy of digital and other infrastructural resources in many public universities.

Awah (2020) traces the digital resource challenges in most public universities in Africa to the Economic Structural Adjustment Programme (ESAP) that some countries including Zimbabwe adopted in the early 1990s. The beneficiaries of the ESAP were directed to reduce expenditure on education and other social services (Zvobgo, 1999), resulting in the severe underfunding of education. Many public universities in Africa have not fully recovered from the financial constraints created by the ESAP (Awah, 2020), making it difficult for them to procure digital resources and shift to online pedagogy. African governments need to invest in digital technology in universities to enable all lecturers to utilise digital means to impart knowledge and skills.

From the perspective of the RAT, access to or ownership of digital technology is a precondition for one to appropriate and utilise virtual platforms (van Dijk, 2005) in teaching and learning situations. African universities in general and Zimbabwean universities in particular, need to provide lecturers with laptops, desktops, and other digital devices to enhance the transition to online instruction and learning.

Reliable internet connectivity

Poor internet connectivity also undermined efforts by lecturers to shift the teaching and learning processes to the Google Classroom platform. One lecturer complained, "*Internet connectivity is so intermittent that connection is frequently lost during a lecture*…." This problem hindered lecturers from streaming live lessons and delivering lectures through video conferencing. "*Very long periods of electricity load shedding that lasted for at least eight hours exacerbated the problem of internet connectivity*," remarked another lecturer. The prolonged periods of load shedding posed two challenges. On the one hand, the lecturers could not conduct online lessons. On the other hand, the students were unable to access learning material and instruction delivered through the Google classroom platform.

Challenges with internet connectivity were highlighted by other researchers (Gurajena et al., 2020) as one of the leading factors that undermined the shift to online teaching and learning during the Covid-19 pandemic in African countries. Tamrat and Teferra (2020) aptly expressed this problem when they said going online was not simple on the African continent where only 24% of the population has access to the internet and poor internet connectivity is a serious challenge. Prolonged periods of electricity load shedding intensified internet connectivity challenges (Gurajena et al., 2021) in African countries. Erratic internet connectivity and prolonged periods of load shedding combined to deny lecturers and students access to the Google Classroom platform.

The RAT emphasises that access to a reliable source of power, and uninterrupted internet connectivity are pre-conditions for the effective utilisation of digital technology (van Dijk, 2012) in virtual teaching and learning environments. There is a need for a reliable internet connection and an uninterrupted supply of electricity so that students and lecturers stay connected to the internet during online lessons.

Sufficient data bundles

During the Covid-19 pandemic era, many lecturers worked from home as a safety precaution from contracting the highly contagious disease. The university management provided the lecturers with data bundles to conduct lessons on the Google Classroom platform. However, "*The data bundles were hardly enough to complete one full online lecture session of three hours*," complained one lecturer. Another lecturer lamented that "*If you used extra data bundles…you weren't reimbursed…you shouldered the cost…it's grossly unfair…*" Through probing, the researchers established that financial constraints forced the universities to provide lecturers with insufficient data bundles. The lecturers were left with no option but to forward learning content to students through WhatsApp and emails. Since the learning content was not explained, the students experienced challenges in mastering it. The lecturers agreed that the problem of insufficient data bundles compromised the quality of online teaching and learning.

The issue of exorbitant data bundle costs as one of the factors that impeded the successful implementation of online teaching in African countries was noted by other researchers (Kibuku, Ochieng, & Wausi, 2020; Kaisara & Bwalya, 2020; Mengistie, 2020). In Zimbabwe, where mobile data bundle tariffs are reported to be the most expensive in sub-Saharan Africa (Dzenga, 2020) many students

failed to gain access to online teaching and learning platforms. The problem can be traced to the underfunding of public universities in Africa and the high cost of data bundles.

From the perspective of the RAT, one needs peripheral resources like software, printers, ink, paper and subscriptions to utilise digital technology (van Dijk, 2012). In the context of this study, data bundles are a form of peripheral resource that is required for lecturers to continue accessing and using the Google Classroom platform. It becomes imperative for African governments to adequately fund public universities and make sure that internet data bundles are affordable. This ensures that lecturers and students gain access to online teaching and learning platforms.

Digital skill needs

This section presents and discusses the findings generated from the responses of the research participants to the second research question: What are the digital skills needs of lecturers during the implementation of online teaching and learning?

Training in online teaching

Following the abrupt Covid-19 induced closure of HTEIs, lecturers were immediately tasked with implementing online teaching and learning without training. Throughout the interviews, the lecturers expressed desperation about utilising Google Classroom without training. One lecturer remarked, "*We were directed to utilise Google Classroom without orientation or training…we were thrown at the deep end….*" The researchers probed the lecturers about how they conducted lessons on the Google Classroom platform without training. A typical response from several lecturers was that they relied on trial and error with very little or no success. The majority of the lecturers failed to use Google Classroom and simply disseminated lecture notes to students through WhatsApp and emails. The result was a less effective online teaching and learning experience for lecturers and students, respectively.

The problem of lack of training for lectures to facilitate online teaching and learning during the COVID-19 pandemic was not peculiar to Zimbabwe. A survey conducted by eLearning Africa (2020) revealed that for many lecturers in HTEIs across the African continent the main obstacle was the lack of appropriate

training to integrate digital technology into their teaching. Similar sentiments were echoed by the lecturers who participated in research studies conducted in Ghana (Adarkwah, 2020) and Eswatini (Gurajena, et al., 2021). The lecturers need formal training on how to utilise online platforms for instructional purposes.

The RAT underscores that individuals need digital skills to effectively utilise digital technology (van Dijk, 2017) in teaching and learning situations. Jain, Lall and Singh (2021) rightly note that online teaching and learning require a specialised form of pedagogy which educators are not familiar with. This explains why many lecturers attempted to utilise the Google Classroom platform without orientation or training and failed. The shift to online teaching and learning typically requires that educators are pedagogically trained to teach online (Mohamedbhai, 2020). For instance, the University of Nairobi successfully organised online teaching and learning workshops for academic staff members during the Covid-19 pandemic (Agyapong et al., 2020). This approach is worth considering in Zimbabwe where the findings of this study indicate that some lecturers lack digital skills to effectively facilitate online lessons.

Online teaching support

The findings show that the lecturers were not provided with sufficient support to help them adapt to online teaching and learning. One lecturer complained, "*We requested for hands-on assistance on how to access, navigate, and utilise Google Classroom platform, but the university provided us with a video on Google Classroom that we tried to follow without success*." Several lecturers revealed that no one attended to the numerous Google Classroom challenges that they faced.

In separate studies, eLearning Africa (2020) and IAU (2020) report that the lack of online teaching and learning support made it very difficult for lecturers to shift from face-to-face to online teaching and learning. This is in line with the observation by Jain et al (2021) that online teaching and learning require a specialised form of pedagogy which educators are not familiar with. Hence, HTEIs in Africa must establish online teaching support structures for developing the online teaching capacities of lecturers so that they easily shift to online pedagogy.

Online usage gaps

This section presents and discusses the findings generated from the responses of the research participants to the third research question: What is the nature of online usage gaps that lecturers encounter when implementing online teaching?

Streaming live lessons

It emerged during the interviews that only five of the 16 lecturers who participated in the study managed to stream live lessons on the Google Classroom platform. The lecturers identified three main factors that contributed to their failure to stream live lessons. One lecturer commented, *"Many lecturers lack the digital competencies to stream live lessons and there was no one to assist them...."* The lecturers also mentioned the problem of insufficient data bundles to access the Google Classroom platform. From the point of view of the RAT, streaming live lessons is a digital usage gap among the lecturers. The universities need to establish online teaching and learning support structures to equip lecturers with the pedagogical skills of streaming live lessons. They should also provide lecturers with adequate data bundles to access the Google Classroom platform and other online platforms when they are not on campus.

During the interviews, it also emerged that the lecturers who managed to stream live lessons were from the ICT departments of their respective universities. By implication, HTEIs can utilise their ICT departments to equip lecturers with the skills of streaming live lessons.

Conducting online experiments

The shift to online teaching and learning also posed serious challenges related to the utilisation of the experimental approach. The lecturers in the natural sciences like Biology, Agriculture, and Chemistry experienced challenges in conducting experiments online. One lecturer remarked, "*The lecturers lack the skills to conduct online experiments so they didn't conduct any experiments….*" This problem was verified by several lecturers who participated in the interviews. When probed, the lecturers revealed that they gave the students notes on the experiment procedures and results because of the lack of digital skills to conduct online experiments. This is another digital usage gap among the lecturers that needs to be addressed. The lecturers urged universities to equip them with the skills of conducting online experiments in preparation for the country's

intention to adopt the blended approach to teaching and learning in the post-Covid-19 era.

Others researchers corroborated that conducting online experiments was a daunting challenge for educators. In a survey of HTEIs in Southern Africa, Mukute, Francis, Burt, and De Souza (2020) report that many educators faced challenges in utilising online facilities to develop students' practical competencies in natural science fields such as Permaculture and Aquatic Science. Research participants in a study conducted by Adedoyin and Soykan (2020) in Cyprus indicated that online teaching was inappropriate for practical disciplines such as medicine, sports, and engineering that require hands-on-experiences as part of instructional activities. However, from the perspective of RAT the researchers argue that the experimental approach is compatible with online teaching. The lecturers need intensive training in digital skills to enable them to conduct online experiments.

Teaching numerical courses online

The findings also show that the lecturers confronted challenges in teaching numerical courses like Statistics and Mathematics through the online mode. The lecturers indicated that before the shift to online teaching and learning it was very easy for them to teach numerical courses. They explained and demonstrated calculations to the students on the chalkboard or whiteboard. Regarding teaching numerical courses online one lecturer remarked "*We don't have any idea of how to teach calculations online…it's a daunting challenge. If there was someone to provide us with orientation or training it would have been better*."

The lecturers resorted to making handwritten calculations that they scanned and send to the students through WhatsApp. When probed about the efficacy of the approach another lecturer responded by saying "*This approach isn't effective at all…students are given worked examples that they may fail to follow or understand. It's more effective to present calculations to the students step-by-step in real-time.…*" From the perspective of the RAT, the lecturers have digital skills gaps that make it difficult for them to teach numerical courses online.

Organising and facilitating online discussions

The Covid-19 pandemic disrupted physical group-based learning because of the need for observing social distance to manage the spread of the pandemic.

This culminated in a sudden shift to online group discussion forums. The lecturers revealed that they experienced challenges in organising and managing online discussions on the Google Classroom platform. One lecturer said, "*The University expected lecturers to organise and manage online discussion groups on the Google Classroom platform, but they lacked the skills to do so…many lecturers created WhatsApp discussion groups instead*." The few lecturers who utilised the Google Classroom platform for online discussions mentioned the challenges they encountered. The recurring challenges included creating online discussion groups, monitoring group discussions, encouraging student participation, and assessing group contributions. These are the online usage gaps that need to be addressed to enhance the effective implementation of online teaching and learning by university lecturers.

Online assessment

The abrupt shift to online teaching and learning posed an assessment dilemma for the lecturers. Online pedagogy requires online assessment, but the lecturers lacked the digital skills to create online assessment tools. One lecturer had this to say, "*Creating online assessment tools such as in-class tests, quizzes, multiple-choice, and true or false statements without training was a challenging task*." Consequently, many lecturers postponed assessing students until face-to-face teaching and learning resumed. Ideally, students should be assessed regularly to establish their level of concept mastery and address any learning gaps.

Before the Covid-19 induced shift to online teaching and learning, lecturers conducted on-site supervision and assessment of students on work-related learning. The transition to online teaching and learning created an assessment conundrum for lecturers because they were not pedagogically prepared to conduct assessments online. *"We relied on the assessment reports generated by the students' supervisors to award work-related learning assessment marks to the students*," remarked one lecturer. This approach to the assessment of students was condemned as one-sided and unreliable by the lecturers. They urged universities to develop online assessment systems to ensure the continuity of student assessment during closures of universities as a result of disasters and other emergencies.

Another online usage gap that emerged during the interviews was conducting online examinations. This came to light when the lecturers revealed cases of some local students who missed examinations after travelling to other countries

and failed to travel back into the country due to the Covid-19 travel restrictions. One lecturer reported that "*The students requested to write the examinations online, but the universities don't have such a facility and the lecturers lack the requisite skills to administer online examinations.…*" This is an online usage gap of both the university management and lecturers that needs to be addressed.

It emerged during the interviews that some lecturers failed to access and mark students' assignments submitted through the Google Classroom platform. When probed, one lecturer stated that, "*The lecturers contended with this problem by asking students to submit assignments to their emails for marking.…*" Another lecturer complained that it was a cumbersome assessment process for large classes of 200 or more students involving downloading the assignments, marking, and emailing them to the students. The online marking challenges of the lecturers can be traced to the lack of orientation or training on how to navigate and utilise the Google Classroom platform.

Existing literature confirms that the Covid-19 induced transition to online teaching created an assessment dilemma for educators. Many educators lacked competencies in preparing and marking online tests and examinations. As a result, examinations were postponed and, in some cases, cancelled (International Labour Organisation [ILO] & World Bank, 2021). Assessing practical skills developed through work-related learning online also posed challenges to the educators. In a study in Zimbabwe, Moyo (2020) noted that the abrupt shift to online teaching and learning created an assessment conundrum for teacher educators concerning supervision and assessment of student teachers on practicum. Sahu (2020) rightly observes that although digital technology has been used to support the teaching and learning process before the outbreak of the pandemic, online assessment is still underdeveloped. In the context of the RAT, online assessment is an online usage gap among educators. There is a need to equip educators with supervision and assessment skills that are in line with the online mode.

5. Conclusions

The outbreak of the Covid-19 pandemic compelled many universities in Zimbabwe to make a sudden shift from face-to-face to online teaching and learning. While the shift to online teaching and learning ensured the continuity of educational provision amid the pandemic, it exposed the online pedagogical needs of lecturers. The universities were unable to provide lecturers with digital

resources that are indispensable for the implementation of online teaching and learning. These include laptops and desktops, reliable internet connectivity, and uninterpreted supply of electricity, and adequate data bundles. Due to the emergency transition to online pedagogy, there was no time for universities to capacitate lecturers with online pedagogical skills. This created online pedagogical skills vacuum that undermined the effective implementation of online teaching and learning. Many lecturers lack proficiency in preparing online teaching and learning materials, streaming live lessons, and conducting online assessments. The study concludes that lecturers have digital resource needs and digital skills gaps that need to be addressed to enhance the transition to online teaching and learning.

6. Recommendations

This section addresses the fourth research question: How can the online pedagogical needs of university lecturers be addressed?

1. The GoZ should consider providing lecturers and students with loans to procure digital devices such as desktops, laptops, tablets, and smartphones. They can also subsidise digital devices to make them affordable to students and lecturers.
2. HTEIs in Zimbabwe need to provide lecturers with intensive pedagogical training in the usage of e-learning platforms. Each HTEI in the country is encouraged to establish an Online Teaching and Learning Support Unit to provide regular technical support to staff members and students.
3. There is a need for the GoZ and its development partners to invest in ICT infrastructure to improve access to the internet and support the transition to online teaching and learning. The ICT infrastructural development initiative should include rural communities where access to the internet is a serious challenge.
4. Mobile and internet service providers in Zimbabwe are urged to lower the costs of internet data bundles to enable lecturers and students to access online teaching and learning platforms.
5. HTEIs in Zimbabwe should have alternative sources of power to mitigate the problem of electricity load shedding that disrupts online teaching and learning.

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