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Navigating the new normal: Challenges in lecturers' adaptation to online learning at a South African university of technology post-emergency remote teaching

Naledi Lenny Kaeane[1], Radiakga Thabang Molokomme[2*]
[1]Tourism & Integrated Communications, Vaal University of Technology, South Africa; naledik@vut.ac.za (N.L.K.).
[2]Legal Sciences Department, Vaal University of Technology, Private Bag X021, Andries Potgieter Blvd, Vanderbijlpark, South Africa; radiakgam@vut.ac.za (R.T.M.).

Abstract: Navigating the rapid shift from emergency remote teaching (ERT) to online learning has been one of the most transformative challenges higher education institutions face worldwide. As the COVID-19 pandemic forced higher education institutions (HEIs) to adopt digital platforms overnight, lecturers grappled with unforeseen obstacles in a rapidly changing academic landscape. The transition from ERT to sustainable online learning has posed significant challenges for HEIs globally. This study examines lecturers' experiences at the University of Technology (UoT) in Gauteng, South Africa, following this shift in the post-COVID-19 era. The research aims to identify key challenges and institutional responses to online learning adaptation specifically after the shift from ERT. Using a qualitative case study approach, semi-structured interviews were conducted with twelve conveniently selected lecturers to explore their lived experiences. The study reveals persistent barriers such as inadequate digital infrastructure, insufficient lecturer training, and disparities in student access to resources. Lecturers also faced difficulties in maintaining student engagement, addressing digital literacy gaps, and navigating the absence of comprehensive support structures. Despite these challenges, institutions demonstrated resilience by implementing adaptive strategies to improve online learning delivery. While online learning offers opportunities for flexibility and innovation, addressing systemic shortcomings is crucial for long-term effectiveness. The study recommends investing in digital infrastructure, enhancing professional development for lecturers, and establishing tailored student support services. Future research should explore the long-term academic and psychological effects of online education and the role of emerging technologies in enhancing learning experiences.

Keywords: *Academic disruption, Challenges, Emergency remote teaching, Higher education, New normal, Online learning, Post-pandemic.*

1. Introduction

The rapid shift to online learning during the COVID-19 pandemic marked a defining moment in higher education (HE) worldwide, challenging traditional pedagogical models and exposing deep technological and resource disparities [1]. For higher education institutions (HEIs) in South Africa, this transition highlighted both the promise and pitfalls of digital education. While emergency remote teaching (ERT) provided a stopgap solution, it was far from a sustainable or comprehensive approach [2]. Thus, in the wake of the pandemic, institutions must confront a critical question *how can they successfully adapt to the "new normal" of online learning while addressing the inequities and inefficiencies laid bare by the crisis*.?

Therefore, in so doing the study examines the challenges in adapting to online learning at a South African UoT following the cessation of ERT. By exploring the institutional challenges experienced by

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* Correspondence: radiakgam@vut.ac.za

lecturers at a UoT after the shift from ERT to online learning, this research sheds light on understanding how HEIs can build on the findings of this study and be able to navigate the complexities of post-pandemic education in a developing country.

Molokomme [3] stresses that online learning and ERT have presented distinct challenges for lecturers at a South African UoT. With online learning, the transition to a fully digital environment exposed gaps in digital literacy among lecturers and students, infrastructure limitations, and inconsistent access to stable internet connectivity [4]. These barriers were further compounded by the need to redesign traditional course materials into interactive, engaging digital formats [1]. On the other hand, ERT implemented as a rapid response to the COVID-19 pandemic posed even greater difficulties. The unplanned shift left lecturers with insufficient time to prepare and adapt pedagogical strategies, resulting in lower-quality instruction and assessments [5]. Additionally, the lack of institutional support and adequate training during the ERT phase highlighted systemic inequities and placed immense stress on lecturers to balance academic continuity with the well-being of their students [1].

Although often conflated, ERT and online learning differ significantly in their purpose and execution. ERT is a temporary and reactive measure, implemented in crises to ensure immediate continuity of education. It often involves transferring existing face-to-face teaching materials online with minimal adaptation, prioritising speed over quality [6]. In contrast, online learning is a deliberate, planned approach to education that integrates robust pedagogical frameworks, interactive tools, and carefully designed digital content to optimize the learning experience [3]. Online learning emphasises flexibility, scalability, and long-term sustainability, while ERT focuses on short-term solutions to maintain functionality during emergencies [7]. Thus, it is apparent that these distinctions underscore the need for institutions to prioritise comprehensive online learning strategies rather than rely on ad hoc ERT approaches during disruptions [8].

The shift to online learning is well-documented as a global response to the COVID-19 pandemic, with studies highlighting the rapid implementation of ERT as a necessary but imperfect substitute for traditional teaching methods Chen [9] and Nkoala [10]. James [11] opined that ERT enabled institutions to maintain academic continuity, and it was largely a reactive approach, characterised by limited planning, inadequate infrastructure, and varying levels of digital literacy among lecturers and students. For South African universities, particularly universities of technology, these challenges were exacerbated by the country's socio-economic disparities, leading to issues such as unequal access to devices, unreliable internet connectivity, and low student engagement [3].

Existing literature has extensively documented the immediate challenges faced during ERT, such as the digital divide, the absence of interactive pedagogies, and the psychological toll on both students and lecturers [12]. However, as the HE sectors move beyond the emergency phase, there is limited research on how institutions are transitioning to sustainable online learning environments. Particularly in the context of South Africa, studies have yet to fully explore how UoT's, rooted in experiential and practical learning are addressing the inherent challenges of online education in the post-pandemic era and post-ERT era.

The gaps in the literature are clear, while research is abundant on the initial phase of ERT, there is a paucity of studies examining challenges with online learning after the ERT and COVID-19 pandemic. Innovations, and the lived experiences of lecturers in adapting to the new normal [2]. Furthermore, little attention has been given to the institutional responses that bridge the divide between theoretical knowledge delivery and the hands-on learning central to universities of technology.

This study seeks to address these gaps by investigating the specific challenges in adapting to online learning at a South African UoT. Through an in-depth analysis, this research aims to explore the challenges experienced following the transition from ERT to online learning at a UoT. The goal is to provide insights that enable institutions to build resilient, inclusive, and effective online education systems, better preparing them for future pandemics or global disruptions. By doing so, it contributes to

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the growing body of literature on sustainable online education, particularly within the context of developing countries.

2. Empirical Literature

The COVID-19 pandemic has profoundly impacted HE systems globally, with developed, emerging, and developing economies experiencing unique challenges and adaptations. In emerging economies, such as Russia and India, the pandemic's implications were far-reaching. Russian, HE faced substantial disruptions, necessitating the transformation of traditional curricula into online formats to maintain academic continuity [13]. While this transition was crucial, it presented significant challenges for students and lecturers, requiring extensive adaptation of the education system [14]. Similarly, in rural India, local governance played a critical role in coordinating pandemic responses, highlighting the interdependence between educational institutions and broader societal structures during crises [15].

In developing countries, the shift from face-to-face teaching to online modalities brought numerous obstacles. The United Nations Educational, Scientific and Cultural Organization [16] reported that HEIs worldwide, particularly in developing nations, had to redirect their focus to operational survival amidst the pandemic. Sahoo, et al. [17] observed that HEIs in the Philippines, Ethiopia, Italy, and Sri Lanka encountered significant challenges in transitioning to online education, exacerbated by technological and infrastructural limitations. In Ireland, comparative studies revealed that the adaptations required for anatomical education during COVID-19 reflected a complex interplay of strengths, weaknesses, opportunities, and threats within HE systems [18]. Similarly, Italy and Saudi Arabia adopted distinct strategies to curb the pandemic's spread while addressing its educational impact [19]. Comparative studies between Hong Kong and the UK also emphasized the importance of public perceptions and preventive behaviors in shaping educational responses during the pandemic [20, 21].

On the African continent, the challenges were even more pronounced. South Africa, as a developing nation, faced a paradigm shift in its HE sectors. Traditional classroom-based teaching gave way to virtual modalities, driven by rapid technological advancements and the necessity of maintaining academic activity amidst disruptions [21, 22]. The adoption of Learning Management Systems (LMS) became central to online learning initiatives, fostering collaboration and communication between students and lecturers [23]. While LMS platforms gained traction in countries like Zambia [24] Nigeria [25, 26] and Cambodia [27] the pervasive digital divide in Africa exposed the fragility of educational systems.

In South Africa, the challenges extended beyond technology adoption. The unavailability of adequate IT resources, coupled with poor internet connectivity and recurring load shedding, severely impeded online learning [28, 29]. The affordability of data and the accessibility of technological devices became significant barriers for many students, particularly those from disadvantaged backgrounds [30]. This situation underscored the socioeconomic disparities that influence access to education. In remote and rural areas, limited technological infrastructure further exacerbated inequalities, emphasizing the need for targeted interventions to bridge these gaps [29].

The challenges of online learning reflect broader concerns discussed in the literature, particularly the unequal distribution of technological resources, which has created fragmented experiences across different demographics [31, 32]. Research highlights the digital divide in access to technology and internet connectivity, disproportionately impacting students from disadvantaged backgrounds [3, 29]. While some adapt well to online learning, others face significant obstacles, mirroring [31] findings regarding the infrastructural challenges South African institutions must address. Moreover, Molokomme [3] raised concerns about increased marks potentially resulting from cheating underscoring the lack of adequate preparation and support for both students and lecturers in navigating this new learning paradigm and ensuring academic integrity.

The literature highlights that the rapid shift to online learning during the COVID-19 pandemic exposed significant gaps in technological infrastructure and digital preparedness across institutions [33]. LMSs like Blackboard have become central to course delivery and communication, while

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collaborative tools have been instrumental in fostering student engagement in virtual environments [34]. Online assessment tools have streamlined evaluation processes and maintained academic integrity [35]. However, challenges such as the digital divide persist, with unequal access to reliable internet and devices presenting a major barrier to effective online education [36]. Addressing these challenges is crucial for leveraging digital tools to enhance learning experiences, ensuring inclusivity and engagement among all students [3, 37]. Furthermore, the pandemic exacerbated existing inequalities in access to resources, significantly affecting the learning experiences of students at universities of technology [33]. While digital tools have enhanced online education, addressing the digital divide requires institutions to provide not only technological solutions but also targeted support and financial aid to create a more equitable learning environment [3].

The transition to online education has deeply affected both teaching staff and students, leading to reduced engagement and diminished educational quality. Crawford, et al. [21] reported less interaction with students, reducing their role to administrative tasks, a concern echoed in the literature, which highlights the erosion of dynamic interactions typical of traditional education. The absence of face-to-face communication has hindered student participation and fostered negative attitudes toward learning Alanezi, et al. [19]. Mtebe [23] expressed concerns about a decline in teaching standards, with lecturers relying heavily on reading slides, and that online teaching quality suffers when content delivery relies excessively on PowerPoint presentations without further elaboration.

Logistical challenges have further exacerbated these issues. Administrative delays have caused frustration for both staff and students, reflecting findings in the literature that logistical barriers can disrupt the teaching and learning process [38]. Communication barriers, often due to connectivity problems, hinder effective interaction [1]. Additionally, a lack of motivation among both staff and students has complicated the situation further. However, Molokomme [3] views these challenges as opportunities for growth, suggesting that perseverance and adaptability can provide valuable lessons for both lecturers and students, reflecting a growth mindset in the face of adversity.

Furthermore, the transition to online education revealed gaps in digital literacy among both lecturers and students. While pedagogical approaches in HEIs worldwide increasingly emphasize the role of instructors as facilitators of learning rather than sole sources of knowledge (Ly, 2024), South African institutions face a steep learning curve. Instructors required an enhanced understanding of student motivations and effective use of digital tools to facilitate virtual education [39]. However, a lack of IT components and insufficient training hindered this progress [3, 40].

Despite these challenges, the crisis also spurred innovation in teaching and learning methodologies. South African universities introduced groundbreaking technologies and digital communication platforms to enhance interaction between lecturers and students. Social media platforms such as Facebook, Twitter, and Instagram emerged as valuable tools for improving communication and engagement in the online environment [22]. However, the sustainability of such innovations remains contingent upon addressing infrastructural and socioeconomic barriers [3].

One of the key gaps identified in the literature is the lack of comprehensive studies understanding the challenges with the shift from ERT to online learning, specifically in low-resource institutions. While some studies highlight the immediate challenges faced by students and lecturers [41] few explore the sustained effects on learning outcomes, particularly in rural and underserved communities. This gap is significant, as understanding these challenges is essential for developing strategies to improve education resilience in the face of future disruptions.

Additionally, the literature reveals a debate over the role of technology in education. Some scholars argue that online education can provide equal access to education, even in low-resource environments [18, 42] while others contend that it exacerbates existing inequalities [22]. This debate underscores the need for further research into how technology can be harnessed to create more equitable educational opportunities, especially in developing countries.

Despite the general agreement that technological infrastructure is crucial for online learning, the literature presents differing perspectives on how this infrastructure should be developed. While some

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scholars advocate for the rapid deployment of high-tech solutions such as 5G networks [20] others emphasise the importance of low-tech, mobile-based solutions that can cater to rural and remote areas [24]. These differing viewpoints highlight the need for context-specific solutions, particularly in developing countries where technological access varies significantly.

The pandemic's impact on HE in South Africa highlights broader issues faced by HEIs globally. The transition to online learning, while necessary, exposed pre-existing inequalities and underscored the need for systemic reforms to ensure equitable access to quality education. Collaborative efforts between governments, institutions, and stakeholders are essential to mitigate these challenges and create resilient educational systems capable of withstanding future disruptions [3].

3. Methodology

3.1. Research Approach

A qualitative approach was chosen as the most suitable for this study, as it facilitates an exploration of the complex and evolving phenomenon of online learning after ERT. Qualitative research prioritises depth over breadth, enabling the researcher to understand participants' personal experiences, perceptions, and challenges [43]. This approach is particularly valuable when studying the transition to online education, as it allows for a nuanced understanding of how lecturers navigate the rapid changes in the educational environment [43]. The flexibility inherent in qualitative research methods is crucial in the post-COVID-19 era, where educational practices and technologies are continuously evolving. By focusing on participants' lived experiences, the study aims to uncover insights that may not be captured by more quantitative approaches [44].

3.2. Research Design

A case study design was adopted for this research, as it provides an in-depth, contextually rich examination of understanding challenges faced by lecturers in an online learning environment after ERT in a specific UoT in Gauteng, South Africa. The case study design is ideal for exploring complex phenomena, especially when the research is focused on a particular institution [45]. This approach allows for the investigation of multiple sources of evidence, such as semi-structured interviews, to gain a comprehensive understanding of the challenges and complexities faced by lecturers after the shift from ERT to online learning [46].

The constructivist paradigm underpins this research design, emphasising the role of participants in constructing their own understanding of online learning after the ERT [47]. By focusing on the lived experiences of lecturers, this research seeks to uncover the challenges, opportunities, and best practices associated with online learning in the post-pandemic era. This perspective allows for the exploration of personnel and institutional narratives surrounding the adoption of online education, offering valuable insights into the broader implications for HE.

3.3. Participants and Setting

The target population for this study includes lecturers at a selected UoT in Gauteng Province, South Africa, with a total of 365 permanent lecturers and 35 lecturers on contracts. The participants were selected based on their direct experience during the implementation of ERT and also currently during the post-pandemic era in the online learning environment at a UoT in South Africa. Lecturers represented various disciplines within the institution. By focusing on this specific population, the study aims to gather rich, contextually grounded data on the experiences of lecturers who have navigated the shift from ERT to online learning.

3.4. Sampling

The study employed a non-probability convenience sampling technique, which is appropriate for qualitative research where participants who are readily available and willing to provide relevant information are selected [48]. The sample consisted of twelve lecturers, chosen based on their

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experience with online learning platforms and methodologies. This sample size was deemed sufficient for capturing a range of perspectives on the effectiveness and challenges of online learning in the post-pandemic context [49]. The inclusion criteria for participation required that lecturers had direct experience with both ERT and online learning during and after the post-pandemic era, ensuring that their insights were relevant to the research questions.

3.5. Data Collection

A semi-structured interview guide was developed to facilitate the collection of qualitative data from the participants. Semi-structured interviews are an effective method for gathering in-depth responses that reflect participants' personal experiences and perceptions [49]. The interview guide consisted of open-ended questions designed to explore participants' experiences with online learning after ERT, and the challenges they encountered.

The interviews were conducted conversationally, allowing participants to express their thoughts freely while guiding the conversation with pre-determined questions. The interviews were audio-recorded, with participants' consent, to ensure accurate transcription and analysis of the data.

To enhance the validity of the interview guide, it was reviewed by three lecturers with expertise in pedagogy and educational practices, who provided feedback on the clarity and relevance of the questions. This process ensured that the instrument was well-aligned with the study's research objectives and would yield meaningful data. Additionally, ethical considerations were strictly adhered to, with participants being informed about the study's purpose, confidentiality measures, and their right to withdraw at any time. Consent forms were obtained before the interviews.

3.6. Data Analysis

The data analysis process followed thematic analysis steps as alluded to by Braun and Clarke [50] which is commonly used in qualitative research to identify and interpret patterns within the data. The first step in the analysis was transcribing the recorded interviews verbatim. This allowed the researcher to become familiar with the data and begin the process of coding [51]. Open coding was employed to identify meaningful segments of the data, such as significant phrases or key ideas that emerged from the participant's responses. Each code represented a specific concept or theme related to the student's experiences with online learning.

Once the initial codes were generated, the researcher grouped them into broader themes. These themes were refined through a process of constant comparison, where the researcher compared data segments across interviews to ensure the themes were supported by the data and accurately reflected the students' experiences [50].

4. Findings and Discussion

The findings of this study are presented below which highlight key themes and insights drawn from the data. The Discussion section integrates these findings with existing literature, ensuring a clear connection between the study's results and established research, thereby providing a comprehensive understanding of the challenges and opportunities identified.

4.1. Theme 1: Adaptation and Institutional Support for Online Learning

Since the onset of the COVID-19 pandemic, institutions have adapted to ERT in various ways. L1 explained that *"it was not an easy transition because there were few online learning applications available. So, we had to adapt and convert applications that are usually used for meetings and social connections as well as for ERT. We basically improvised. The official application of the institution is rather intimidating to use because we are not sure who can access the data we use to lecture students. So, to be comfortable and free, most lecturers use their own applications that are not specifically meant for lecturing, and we use them to teach."*

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However, post the ERT era, as HEIs, specifically UoT shifted from ERT to online learning, L2 noted that *"some facilitators still struggle with the official online learning platform, Blackboard, and do not go for training."* On the other hand, L3 shared, *"Vutela was fully utilised by academics for teaching and learning, as well as assessing students."* L4 described the situation by saying, *"since the onset of the COVID-19 pandemic, my institution has made significant strides in adapting to ERT. Initially, we rapidly transitioned to digital platforms to ensure the continuity of education, utilising tools like Zoom, Microsoft Teams, and various LMS to facilitate remote teaching and learning."*

Additionally, L5 briefly commented that the institution has, *"[m]oderately adapted to technology challenges,"* while L6 remarked, that, *"in the beginning, it was quite challenging, but things have stabilised, and most learning is blended or hybrid, while some courses are fully online."* L7 observed that, *"the implementation thereof was left to the discretion of individual lecturers."* L8 recalled, *"the institution provided laptops for students and some of the staff members. At the beginning, it was a matter of trial and error in teaching and learning."* In contrast, L9 criticised that adaptation was *"[p]oor, since students are not provided with data, and the same applies to lecturers. Also, some lecturers don't have laptops to conduct online learning."* L10 explained that *"[a]t first everything had to happen online, but now we make use of a hybrid system."* L11 responded with a simple *"yes"* when asked about adaptation. Furthermore, L12 shared that the institution has *"[p]rovided access to Wi-Fi for students/lecturers to use laptops/smartphones, etc., Wi-Fi on campus and VUT residences, upgraded Blackboard (Vutela), workshops for lecturers on online teaching, and workshops for lecturers to be able to use Blackboard (Vutela) more effectively."*

4.2. Theme 2: Student Engagement and Performance in the Online Learning Environment

In terms of student engagement and performance, L1 noticed that *"[e]ngagement decreased, but the performance remained consistent."* L2 observed that *"the attendance is extremely poor, and those students who do attend online classes provide little to no feedback."* L3 added the fact that *"students struggled as some did not have devices and data to do their school. Students do not attend online classes as much as face-to-face classes. Students get good results on assessments as senior students might assist them with online tests.*" L4 said, *"the transition to online learning has been a mixed experience, with some students adapting well and even excelling, while others have faced significant challenges that have affected their engagement and performance."* L5 expressed a concern, saying that *"students getting good marks is a worry."* L6 mentioned, *"there has been a steady increase in attendance of online learning sessions. The methods of capturing student attendance have improved with automatic registers of BlackBoard and Teams. During sessions, larger groups participate less than smaller groups. More and more students have access to online learning via funding and support for devices and data."*

Additionally, L7 has noted that *"[s]tudents tend to perform relatively better in online assessments, but when it comes to engagement, the answer is not given."* L8 echoed this, stating that *"students usually do not attend online classes. However, they obtain high marks in assessments."* L9 observed, *"in my experience, students engage more in contact sessions rather than online. During online sessions, they just log in and mute. In addition, some of the views from my students is that they prefer contact instead of online."* Conversely, L10 felt that *"[s]tudents do better and because I can give them a better 'experience' in an online class they also enjoy it more."* L11 pointed out, *"a major decline in lecturer and student engagement. Performance in online tests: Marks have increased due to students easily being able to cheat; students may pay other 'better performing' students to complete tests for them."* Lastly, L12 concluded that *"students mostly prefer online classes to contact classes on campus. They may log in to sessions, but do not participate actively during online classes. Performance: overall good. It is difficult to control cheating whilst writing online assessments (open book concept/assistance of friends)."*

4.3. Theme 3: Digital Platforms and Tools used for Online Learning and Teaching

The primary digital platforms and tools utilised by the lecturers at a UoT for teaching, as stated by participants, include a variety of resources. The following are excerpts of participants regarding the digital platforms used at a UoT in Gauteng Province.

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L1: Mentioned "*Vutela, WhatsApp, YouTube, Google, Pinterest and Teams.*"
L2: "*Blackboard (Vutela) and Teams are the official online platforms.*"
L3: *Vutela.*
L4: *Teams.*
L5: *Vutela.*
L6: *Blackboard – BlackBoard Collaborate, MS Teams, Zoom.*
L7: *Computer/Blackboard and WhatsApp.*
L8: *The institution uses computers and cell phones to access Blackboard. Some lecturers also use WhatsApp for T&L.*
L9: *Zoom and Teams.*
L10: *Blackboard (Vutela).*
L11: *"Blackboard (Vutela), Smartphones, Computers.*
L12: Blackboard (Vutela), Smartphones, Computers."

4.4. Theme 4: Effectiveness of Digital Tools in Enhancing Learning Experience

When assessing the effectiveness of these digital tools in enhancing the learning experience for students, responses varied, where L1 states that "*Because our subject is not difficult, they get the job done.*" L2: pointed out that "*the platforms themselves are user-friendly, and all students have access to them. However, the students choose not to attend the online classes.*" *On the other hand,* L3 revealed that the effectiveness of the digital tool *"[a]re very good and user-friendly.* Also, "*[V]ery useful and effective and efficient, but there are some areas on campus where there is no access to connectivity* (L5). Additionally, L6 mentioned that they are "*Very effective, although Zoom is the least used as it costs a lot, and the free version has a 30-minute time limit for meetings."* However, it was pointed out that "*[t]hey only teach students to memorise and reproduce information because the students are prepared to answer True/False, Multiple questions or matching of columns with scant regard for testing insight or application competencies"* (L7). "*Unlike the human factor, these tools are not very effective. Sometimes, students only open lessons when they write online assessments* (L8)".

Contrary to that, L9 states that "[t]hey are *not effective at all. For example, Zoom provided a minimum of 40 minutes per meeting; as a result, students are not able to ask questions they might have, and others are in areas without connectivity. Also, they lack the human interaction and connection."* But L10 sees them as "*[V]ery effective. I spend a lot of time creating content (PowerPoint presentations, videos, etc) that I share during our classes and post (it) on Vutela after completion of the units."* L11 states that it "*Significantly enhances student engagement, motivation and academic performance (can share learning material, play short videos, listen to snippets during online presentations)."* However, it is pointed out that "*These challenges may teach both lecturers and students all about perseverance and to find alternative solutions"* (L12).

4.5. Theme 5: Disruptions in Educational Engagement

The challenges faced in online learning have significantly affected both teaching staff and students in various ways. L1: alludes to the fact that *"There is less engagement with students, which reduces our lecturing to be largely administrative. However, we have adjusted, and the core business still gets done. Online learning kills the joy of being a lecturer, meeting students face to face."* L2: noted that *"[t]here is a disconnection between students and teachers as there is no visible nonverbal communication.* This lack of interaction has led to "*students not engaging and interacting, resulting in poor online class attendance and a negative attitude towards studying and teaching"* (L11). Furthermore, L9 states that *"the standard of teaching has dropped, with some lecturers just reading slides without explaining further concepts. Quality of teaching may have decreased."* The inability to effectively start sessions due to administrative delays is evident as L10 states that *"we cannot start on Vutela immediately for the big groups because CAD must first create daughter groups, leading to frustration for both lecturers and students."*

Communication issues have also arisen, as L8 mentions that *"sometimes the teaching staff and students cannot communicate effectively because of these challenges. Connectivity issues cause problems, but since recordings*

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are made of all classes, students can watch them later when their issues are resolved." Additionally, there is a *"lack of motivation for both staff and students, and isolation has set in* (L11), contributing to a *"[v]ery bad situation that causes delays and disruptions to the teaching and learning process* [L4]. To adapt, *"lecturers have had to record classes and make videos for students who might miss classes due to data or network issues* (L3), while *"some learning activities were delayed while others were rushed, affecting the overall learning experience"* (L5). Ultimately, *"these challenges may teach both lecturers and students about perseverance and finding alternative solutions"* (L12).

5. Discussions

The findings reveal a multifaceted landscape of adaptation and institutional support for online learning at HEIs in South Africa during the post-COVID-19 era. While some institutions have successfully transitioned to online platforms, leveraging tools like Zoom, Microsoft Teams, and Vutela, others have faced significant infrastructural challenges. Many lecturers resorted to using non-specific applications for teaching due to the intimidating nature of official platforms like Blackboard. This sentiment is echoed in the literature, which highlights how the rapid shift to online learning exposed pre-existing inequalities in digital access and readiness, disproportionately affecting students from disadvantaged backgrounds [29]. Furthermore, inadequate training for lecturers hindered effective teaching, with Molokomme [3] noting that many lecturers encountered a steep learning curve, negatively impacting student engagement and learning outcomes. Despite these challenges, some participants acknowledged the institution's efforts to support online learning, such as providing access to Wi-Fi and laptops. However, critiques regarding the adequacy of these adaptations persist, with ongoing issues like insufficient data for students and staff exacerbating the digital divide. This reflects broader concerns articulated in the literature regarding the uneven distribution of technological resources, which has resulted in a fragmented online education experience across demographics [31, 32]. While significant progress has been made in adopting online learning, persistent infrastructural barriers and inadequate lecturer training remain critical challenges to achieving equitable and effective education.

The findings also highlight significant challenges in student engagement and performance. Although some students have performed well on assessments, there remains a troubling disconnect between engagement and performance, as many students infrequently attend online classes and provide minimal feedback. This aligns with literature emphasising the digital divide in access to technology and connectivity, which has disproportionately impacted students from disadvantaged backgrounds [3, 29]. Mixed experiences among lecturers suggest that while some have adapted effectively to online learning, others face significant hurdles, echoing [31] findings on the infrastructural challenges confronting South African institutions. Additionally, lecturers raised concerns about increased marks potentially resulting from cheating, highlighting a lack of preparation and support for both students and lecturers. Thus, it can be deduced that the findings underscore the need for improved digital infrastructure, better lecturer training, and comprehensive strategies to ensure equitable access and meaningful engagement in online learning.

A variety of digital platforms and tools are being used by lecturers at a UoT in Gauteng Province for online teaching and learning, with systems like Vutela, Microsoft Teams, WhatsApp, and YouTube playing a central role. This diverse approach reflects a broader trend identified in the literature, where the COVID-19 pandemic necessitated a rapid shift to online learning, exposing gaps in technological infrastructure and digital preparedness [33]. While LMSs like Blackboard are essential for course delivery, collaborative tools have become critical for fostering student engagement in virtual settings [34]. Online assessment tools have also streamlined evaluation processes and maintained academic integrity [35]. However, the literature highlights challenges such as the digital divide, where unequal access to reliable internet and devices continues to hinder effective online education [38]. Addressing these challenges is crucial as institutions seek to leverage digital tools to enhance the overall learning experience while promoting inclusivity and engagement for all students [3, 37].

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Additionally, many emphasised the importance of better data support and tailored assistance for underfunded programmes, pointing to disparities in institutional support that leave them feeling neglected. This aligns with literature indicating that the COVID-19 pandemic exacerbated existing inequalities in access to technology and resources, affecting the learning experiences of students at universities of technology [33]. While digital tools such as LMSs and collaborative platforms have been adopted to enhance online education, the ongoing digital divide remains a critical challenge [36]. This calls for interventions for those struggling with internet access for institutions to not only implement technological solutions but also ensure these tools are accessible to all parties involved, thereby creating a more equitable and effective online learning environment [3].

The challenges faced in online education have profoundly impacted both teaching staff and students, resulting in decreased engagement and diminished educational quality. Lecturers reported reduced student interaction, with their roles often reduced to administrative tasks. This aligns with literature emphasising how online learning undermines the dynamic interactions characteristic of traditional education (Crawford et al., 2020). Additionally, lecturers highlighted that the absence of face-to-face communication hinders student participation and fosters negative attitudes toward learning [19]. Some expressed concerns about declining teaching standards, with lecturers resorting to simply reading slides, a sentiment echoed by Mtebe [23] who argued that quality suffers when lecturer overly rely on PowerPoint presentations without elaboration. Logistical issues further exacerbate these challenges, with administrative delays frustrating both staff and students. This reflects findings from the literature on how logistical problems disrupt teaching and learning processes [38]. Communication barriers and connectivity issues were also cited as significant obstacles [1]. Despite these difficulties, some lecturers concluded that the challenges of online learning have provided valuable lessons in perseverance and adaptability, reflecting a growth mindset in navigating adversity [3].

Therefore, the findings reveal a complex interplay of progress and challenges in the adaptation to online learning in South African HEIs during the post-COVID-19 era. While strides have been made in adopting digital platforms and providing institutional support, significant barriers, including infrastructural challenges, inadequate training, and the digital divide, persist. The literature and findings underscore the need for holistic strategies that address these barriers, ensuring equitable access, meaningful engagement, and improved learning outcomes for all students.

6. Conclusion

This study has illuminated the challenges experienced by a UoT in Gauteng Province during the transition from ERT to online learning in the post-COVID-19 era. While notable advancements have been made in adopting digital tools and platforms, persistent barriers such as the digital divide, inadequate infrastructure, and limited training for lecturers have hindered the effectiveness of online education. These challenges have disproportionately impacted students from disadvantaged backgrounds, further entrenching systemic inequalities in HE. Despite these obstacles, the resilience and adaptability demonstrated by both lecturers and students provide a foundation for envisioning more inclusive and effective online education systems. A key takeaway from this research is that the transition to online learning is not a temporary response but an enduring component of modern education that requires careful planning, equitable access, and institutional commitment to long-term sustainability.

To address the challenges identified the researcher proposed several recommendations. HEIs should prioritise investments in digital infrastructure, ensuring equitable access to devices and reliable internet for all students and lecturers, particularly those in underserved areas. Subsidised data packages, the establishment of community Wi-Fi hotspots, and the provision of laptops or tablets are essential steps toward closing the digital divide. Additionally, comprehensive and ongoing training programs for lecturers should be implemented to enhance their ability to deliver engaging and effective online content. Institutions must also develop tailored support services for students, including academic advising, digital literacy training, and mental health resources, to address the unique demands of online learning. Engagement strategies such as virtual workshops, collaborative projects, and interactive

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forums should be employed to mitigate the disengagement often associated with online education. Furthermore, institutions should establish mechanisms to regularly monitor and evaluate the effectiveness of online learning systems, using feedback from students and staff to refine and improve practices.

In addition to these practical recommendations, this study highlights the need for further research to support the development of robust online education systems. Future studies should explore the long-term impacts of online learning on academic performance and mental health, with particular attention to how different demographic groups are affected. Research into innovative technologies, such as virtual reality and artificial intelligence, could provide valuable insights into enhancing engagement and accessibility in virtual learning environments. Additionally, comparative studies across different institutions and countries could offer a broader understanding of best practices and potential strategies for overcoming common challenges. By addressing these research gaps, scholars can contribute to the continuous improvement of online education and better prepare higher education institutions for future global disruptions.

Ultimately, the findings and recommendations from this study provide a roadmap for building resilient, inclusive, and effective online education systems that not only address current challenges but also anticipate and adapt to future needs. Institutions must commit to these efforts to ensure that no lecturers who are left behind in the ongoing digital transformation of education.

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Institutional Review Board Statement:
This study was conducted in accordance with the ethical norms and standards of research and was approved by the Institutional Review Board (IRB) of a UoT (Ref: FREC/HS/03/15/2024/6.1.1) on 24 June 2024. Additionally, a gatekeeper's letter was obtained, granting permission to conduct interviews with lecturers within the UoT premises.

Transparency:
The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Authors' Contributions:
All authors contributed equally to this research. The authors contributed significantly to the conceptualisation, methodology, review, and editing. Both authors reviewed and approved the final manuscript.

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