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Understanding Difficulties of Emergency Remote Teaching and Learning in Higher Education: Preparing Institutions in the Vaal Region for Future Crises

Radiakga Thabang Molokomme* **and Mahlomola Mahlakwana**
Vaal University of Technology
Legal Sciences Department

Abstract. This study explores the challenges faced by South African higher education institutions (HEIs) during the rapid shift to Emergency Remote Teaching and Learning (ERT&L), particularly under the compounded strain of national loadshedding. While ERT&L initially emerged in response to the COVID-19 pandemic, this study adopts a broader interpretation of the concept, examining its application in both pandemic-related and ongoing emergency contexts such as energy crises. The research addresses a critical gap in existing literature by examining the intersection of technological limitations, institutional unpreparedness, and socio-economic disruptions using the Technology-Organization-Environment (TOE) framework. Employing a qualitative, phenomenological approach, the study captures the lived experiences of ten purposefully selected students and lecturers from a HEI in the Vaal area through semi-structured interviews. Thematic analysis revealed that technological constraints, lack of institutional readiness, and the unpredictability of loadshedding significantly undermined the effectiveness of ERT&L. Moreover, participants reported high levels of stress and psychological strain, prompting a recommendation to expand the TOE framework to include human factors. The findings underscore the urgent need for improved digital infrastructure, institutional policy reforms, and comprehensive support systems to build a more resilient and equitable online education model. This research offers valuable insights for policymakers and educational stakeholders seeking to strengthen the sustainability and accessibility of digital learning in the face of future crises.

Keywords: emergency; remote teaching and† learning; online learning; future crisis; load shedding and higher education

* Corresponding author: *Radiakga Thabang Molokomme, radiakgam@vut.ac.za*

1. Introduction

The COVID-19 pandemic affected the conventional style of teaching and learning (T&L) across the globe, as educational institutions had to shift from face-to-face learning to emergency remote teaching and learning (ERT&L) (Abdalellah et al., 2020). This change posed unique challenges for students and lecturers, particularly in higher education (HE), which relies on multiple methods of teaching, learning, and evaluation to be effective (Shahzad et al., 2021). ERT&L was instituted as a measure for the time being without proper equipment, infrastructure, or resources for effective delivery (Mpungose, 2020).

According to Oliveira, Teixeira, Torres, and Morais (2021), the rapid change from conventional in-person education to ERT&L during global disruptions such as the COVID-19 pandemic is proving difficult for students and lecturers in HE. This change was made without prior planning, revealing a lack of sufficient technology, digital skills, and pedagogical resources (Oliveira et al., 2021). Students struggled with the lack of dependable internet access, appropriate devices, and supportive spaces for studying, which decreased their engagement and performance (Shin & Hickey, 2021). On the other hand, Iglesias-Pradas, Hern´andez-garcía, Chaparro-Pel´aez, and Prieto (2021) established that lecturers fought to be acquainted with new online teaching technology, reorganize the course content for distance education, and ensure that there was a reasonable level of communication with the students.

Scholars caution that the teaching approach adopted during the transition to digital platforms due to the COVID-19 pandemic should not be classified as "online learning." Instead, a distinct term, “emergency remote teaching," has emerged to describe this temporary adaptation more accurately (Iglesias-Pradas et al., 2021:2; Kaeane & Molokomme, 2025). Kaeane et al. (2025) explain that ERL and online learning differ in their design, intent, and implementation. Furthermore, ERL is a temporary, rapid shift to remote instruction due to an unexpected crisis, such as the COVID-19 pandemic. Although this shift was initially triggered by the pandemic, this paper argues that ERT&L has evolved into a broader emergency response framework. In the South African context, where persistent disruptions such as load shedding continue to impact remote education, ERT&L is no longer limited to pandemic-related circumstances but includes other national crises that hinder traditional learning.

Therefore, it is often implemented with limited preparation, relying on existing technology to maintain continuity in education (Engle, 2020; Molokomme, 2024). As a result, ERT&L typically lacks the instructional design principles of well-planned online courses, leading to challenges such as inconsistent student engagement, inadequate assessment methods, and difficulties in maintaining learning outcomes. The primary goal of ERL is to provide immediate access to education rather than optimize the learning experience (Molokomme, 2024).

In contrast, online learning is a carefully planned and structured approach that utilises digital platforms to facilitate education. Additionally, it is intentionally designed using pedagogical frameworks that support interactive learning, student engagement, and effective assessment strategies (Molokomme &

Motebe, 2025). Online courses often incorporate multimedia content, discussion forums, and adaptive learning technologies to enhance the educational experience (Molokomme et al., 2025). Unlike ERL, Online learning ensures that course materials and teaching methodologies are aligned with learning objectives, promoting long-term academic success (Sun, 2024). Therefore, the key difference lies in the level of preparedness and instructional quality, as online learning is purposefully developed, while ERL is an improvised response to unforeseen disruptions (Kaeane et al., 2025).

In the South African context, load shedding has emerged as another major disruption to ERT&L, further compounding the challenges faced by HEIs. According to Bakht et al. (2024), load shedding is the intentional, scheduled interruption of the electricity supply to prevent a total power grid collapse when electricity demand exceeds supply. South Africa's load shedding is categorised into stages, ranging from Stage 1 (minimal interruptions) to Stage 8 [extensive power cuts for up to 12 hours per day] (Mkhize, 2022). A recent report by BusinessTech (2025) revealed that the country had escalated to Stage 6, meaning that large areas experience up to six scheduled power outages per day. These disruptions severely hinder students' ability to attend online classes, access digital resources, and submit assignments on time. While also affecting lecturers' capacity to deliver consistent and effective instruction (Molokomme, 2024). Thus, it is evident that understanding both pandemic-related disruptions and persistent load shedding is crucial for ensuring the future resilience of HE in South Africa.

However, these problems not only hindered the learning process but also worsened the pre-existing gaps in educational attainment (Iglesias-Pradas et al, 2021). The shift to ERT&L disproportionately affected students from disadvantaged backgrounds who lacked access to stable internet, appropriate devices, and quiet study spaces. In South Africa, persistent socio-economic inequalities further widened this gap, as many students from low-income households were unable to participate fully in online learning due to financial and infrastructural barriers.

Load shedding has amplified these disparities by disrupting scheduled online classes, limiting access to digital resources, and interrupting communication between students and lecturers (Yende, 2024; Mashiyane et al., 2024). However. Some students could mitigate these disruptions through backup power sources or access to alternative learning spaces, but many others were left without the means to continue their studies effectively during power outages (Molokomme, 2024).

The significance of understanding these challenges lies in ensuring equitable access to education during crises. Therefore, by understanding these gaps, higher education institutions (HEIs) will be able to develop robust strategies that not only improve digital infrastructure and teaching capacity but also include contingency plans for recurring disruptions like load shedding. Additionally, HEIs can implement more inclusive policies, invest in alternative energy sources, and offer targeted support to disadvantaged students. This

preparedness will help mitigate the impact of future crises, ensuring that all students have a fair opportunity to succeed, regardless of their socio-economic background or the external disruptions they face.

Thus, the study aims to explore the difficulties experienced during ERT&L and load shedding in HE, with a specific focus on a HEI in the Vaal Region of Gauteng province, South Africa. The study seeks to identify the challenges faced by both students and lecturers during disruptions such as the COVID-19 pandemic and load shedding. Ultimately, it aims to provide insights that will help HEIs develop effective strategies to enhance preparedness for future crises, ensuring equitable access to quality education for all students. Therefore, examining these challenges, this study provided a nuanced understanding of the difficulties experienced in ERT&L contexts and Load shedding, offering valuable insights to enhance the preparedness and resilience of HEIs for similar disruptions in the future.

Given the complexity of these challenges and offering insights into the future preparedness of HEIs. The research questions that guide this study are as follows:

- What technological, organisational, and environmental challenges did HEIs in the Vaal Region face during the implementation of ERT&L?
- How did national load shedding exacerbate existing difficulties in ERT&L, particularly in relation to students' and lecturers' ability to access and deliver online education effectively?
- How did students and lecturers in HEI adapt to the sudden transition to ERT&L, and what were the key challenges faced in terms of platform navigation, engagement, and interaction?
- How can HEIs in the Vaal Region improve their institutional readiness, infrastructure, and policy responses to ensure equitable and sustainable remote teaching during future crises?

2. Literature Review

The literature offers an analysis of the literature concerning fundamental elements that relate to the effect of ERT in HE due to the COVID-19 pandemic and load shedding. The literature review establishes previous research, which leads to precise, insightful questions about the problem (Rikhotso, 2022). However, the primary goal of analysing these studies is to evaluate and summarise the sources mentioned and how they contribute to this study. These studies aim to inform the reader of the significance, precision, and reliability of the cited sources.

Existing literature looks at the transition from face-to-face to distant or online learning as emergency remote learning due to COVID-19 for students and lecturers, and its challenges. The COVID-19 pandemic has caused education providers to engage pandemic pedagogy as a philosophy underpinning their teaching and learning strategies (Engle, 2020). However, there is a lack of research that looks at a rapid transition to online learning in response to a crisis like COVID-19 and load shedding in a developing country like South Africa.

The COVID-19 pandemic has prompted a global shift to online learning, which has led to a great deal of research into the complex issues that educational institutions, students, and teachers face. However, some of the most important themes are technological limitations, inadequate infrastructure, outdated devices, and unstable internet connectivity have made it difficult for students to participate successfully in remote learning environments (Adedoyin & Soykan, 2020; Doucet et al., 2020). Research in low- and middle-income countries shows that many institutions were not prepared to facilitate a smooth transition, exposing differences in digital readiness across educational institutions (Czerniewicz et al., 2020; Williamson et al., 2020).

Furthermore, technological constraints provide accessibility challenges, especially for students from underprivileged socioeconomic backgrounds and those with disabilities. Park and Shea (2020) indicate that many platforms did not apply universal design principles, and students with sensory or mobility impairments frequently faced obstacles when trying to access online course materials. Moreover, existing disparities were worsened by financial difficulties made worse by the pandemic, which resulted in unequal access to necessary tools and devices (Molokomme, 2024; Czerniewicz et al, 2020).

One of the key factors influencing learning outcomes throughout this transition is the digital divide, or the difference between those who have access to sufficient digital resources and those who do not (Kaeane & Molokomme, 2025). Based on empirical research, students from marginalized populations and those living in rural areas were disproportionately excluded from online learning because they had less access to digital literacy training and high-speed internet (Zhong, 2020). As a result, there have been requests for focused interventions to close these disparities and promote inclusivity in online education because of this divide.

The sudden switch to online education due to COVID-19 required major changes in pedagogy. Hodges et al. (2020) highlight that lecturers were frequently unprepared for the sudden shift and make a distinction between ERT&L and deliberate online pedagogy. Many took a content-centric approach, which harmed learning outcomes and decreased student engagement. According to Rapanta et al. (2020), adaptive teaching strategies that used multimedia and collaborative technologies were found to improve interactivity and alleviate some difficulties.

Students and lecturers experienced significant emotional and psychological effects from the shift. Afzal, Khan et al. (2023) show that higher workloads, lack of peer interaction, and academic ambiguity cause students to feel more anxious, stressed, and alone. Therefore, lecturers encountered similar difficulties as they attempted to adjust to new teaching strategies while preserving the standard of instruction, including burnout and technical weariness (Hodges et al, 2020).

Load shedding during the COVID-19 pandemic had a profound impact on T&L, particularly in countries like South Africa, where rolling blackouts disrupted education. Mesuwini and Mokoena (2024) highlight that while students

appreciated the flexibility of online learning, lecturers faced challenges due to incompatible technology and frequent power outages. This situation often forced a reversion to traditional teaching methods, undermining the progress made in digital education. Furthermore, load shedding exacerbated existing challenges in HE, affecting both academic performance and institutional operations (Kaeane & Molokomme, 2025). A study conducted among students from the universities in South Africa reported that half of the participants agreed that load shedding affected their study time, inability to concentrate during lectures, and caused disturbance in exam preparation (Khan, Ayub & Farooq, 2022). This demonstrates the adverse effects of load shedding on student activities at home and in their learning institutions (Yende, 2024). Furthermore, in determining ICT usage and skills among students in South Africa, the findings revealed that load shedding was the primary concern for students who used ICT at home (Yende, 2024; Mashiyane et al., 2024).

3. Theoretical Framework

The Technology Organisation Environment (TOE) Framework was propounded by Tornatzky and Fleischer (1990) in the 1990s. This framework serves as the theoretical foundation for this study, offering a comprehensive lens through which to examine the challenges posed by ERT&L and load shedding in HE (Tornatzky & Klein, 1982). The TOE framework posits that the successful adoption and implementation of technology within an institution are shaped by three interdependent dimensions: technological readiness, organizational capacity, and environmental influences. In the context of ERT&L, technological readiness refers to the availability of digital infrastructure, including access to reliable internet, digital devices, and learning management systems, which were severely lacking during the rapid shift to remote learning (Misirli & Ergulec, 2021). However, in South Africa, this challenge is exacerbated by persistent load shedding, which disrupts students' and lecturers' ability to participate in online learning, further widening the digital divide (Azıonya & Nhedzı, 2021). Organisational capacity focuses on the preparedness of HEIs to integrate digital learning, including the availability of structured e-learning policies, lecturer training, and contingency strategies for educational continuity (Mpungose, 2020). Yet, many HEIs struggled to effectively support both students and faculty during ERT&L, lacking the necessary frameworks to ensure pedagogical quality and equitable access to education.

However, it is worth noting that while there are some models, such as the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Digital Divide Theory offer important insights into technology use, the TOE framework was selected for its broader organisational and environmental scope, which aligns more closely with the institutional-level focus of this study (Mpungose, 2020). The TOE framework was selected for this study because of its comprehensive, multi-level approach to examining technology adoption, particularly at the institutional level. Unlike other theories like the UTAUT, which primarily focuses on individual users' behavioural intentions and perceptions (Venkatesh et al., 2003). TOE allows for a broader analysis that includes organisational readiness and external environmental pressures, both of which are central to understanding the challenges of ERT&L under load

shedding conditions. While the Digital Divide Theory effectively highlights disparities in access to digital resources, it lacks the structural lens needed to evaluate institutional policies, capacity, and response strategies (Van Dijk, 2006). TOE, as developed by Tornatzky and Fleischer (1990), captures the interplay between technological infrastructure, organisational preparedness, and socio-environmental constraints, offering a more suitable theoretical grounding for analysing the systemic impact of crises such as the COVID-19 pandemic and power outages on HEIs in South Africa. This broader analytical scope enables the study to propose more holistic, context-specific interventions.

The environmental dimension of the TOE framework considers external factors such as government policies, socio-economic disparities, and infrastructural limitations. All of which have played a critical role in shaping HEIs' ability to sustain digital education in South Africa (Alqahtani, 2016). The abrupt transition to ERT&L during the COVID-19 pandemic disproportionately affected students from disadvantaged backgrounds who lacked stable internet connections, appropriate devices, and quiet study spaces, thereby exacerbating existing inequalities in HE (Iglesias-Pradas et al., 2021). This digital divide has been further intensified by load shedding, as scheduled power outages prevent students from accessing online learning platforms, submitting assignments on time, and engaging in virtual discussions (Yende, 2024). Moreover, HEIs have struggled to mitigate these disruptions due to limited alternative energy sources and an overreliance on traditional teaching models that were not designed for digital resilience (Molokomme, 2024). By employing the TOE framework, this study critically examines how technological constraints, institutional readiness, and external disruptions collectively impact the effectiveness of ERT&L. Furthermore, it seeks to provide strategic recommendations for HEIs in the Vaal Region, ensuring that future digital education initiatives are more resilient, inclusive, and adaptable to crises such as pandemics and ongoing load shedding.

4. Methodology

According to Davidavičienė (2018), research methods encompass all the instruments and approaches employed for conducting research, while research methodology pertains to the plan utilised to effectively address the research problem. In the conducted research, a qualitative methodology was utilised to delve deeply into the subject matter, understanding, and interpretation of the data (Senekal & Lenz, 2020). The chosen approach centered on phenomenological design, aiming to comprehensively describe and depict the phenomena under investigation. (Creswell & Poth, 2017). The researcher deemed this approach appropriate for this study as it helps uncover the personal challenges, emotions, and coping mechanisms that quantitative data alone cannot fully capture. This involved a meticulous exploration of the intricacies and nuances, utilising methods such as semi-structured interviews (Creswell & Creswell, 2018). Semi-structured interviews were designed around open-ended questions aligned with the study's research. These questions aimed to elicit rich narratives about participants' experiences with ERT&L and load shedding. To ensure reliability and trustworthiness, the interview guide was piloted with two participants before formal data collection to refine clarity and consistency

(Creswell & Poth, 2017) These interviews were instrumental in gathering rich, in-depth insights from participants, providing a flexible framework to guide the conversation while allowing for the emergence of unexpected perspectives and details (Cresswell et al., 2012).

Moreover, the research utilised purposive sampling to select participants who were drawn from a population of students and lecturers from a HEI in the Vaal area, deliberately based on specific criteria relevant to the study's objectives. This method ensured that the chosen participants possessed key characteristics or experiences essential for shedding light on the research questions, enhancing the depth and richness of the gathered data (Moerane, 2016). Purposive sampling allowed for a targeted selection process, maximising the chances of acquiring diverse and comprehensive insights that aligned with the research's goals (Tunde, 2022).

The inclusion criteria for this study required that participants be either students or lecturers from a HEI located in the Vaal area who possess relevant lived experiences aligned with the focus of the research. Specifically, participants must have experienced ERT&L during the COVID-19 pandemic, as well as the transition back to traditional or blended learning approaches in the post-pandemic period. In addition, participants should have encountered online learning or teaching challenges during times when South Africa was experiencing load shedding at Stages 1 to 6. These dual experiences are critical for the study, as they provide valuable insights into the impact of both emergency teaching methods and persistent infrastructural disruptions on academic performance, teaching strategies, and student engagement (Molokomme et al., 2025). By focusing on individuals who meet these criteria, the study ensures a rich and contextually grounded understanding of the complexities involved in navigating HE under compounded crises.

In-depth interviews were used to identify members' feelings, emotions, and presumptions about the study, allowing the researcher to collect a large amount of information with a specific goal in mind (Langkos 2014). All ten individuals were interviewed individually for ten days, from November 1st to 15th, 2023, with one interview conducted per day. The decision to include 10 participants was guided by the principle of data saturation, a point at which no new insights or themes emerge from additional interviews (Creswell & Poth, 2017). In phenomenological research, depth of understanding is prioritised over sample size, and a smaller, purposively selected group allows for rich, detailed exploration of lived experiences (Molokomme, 2024; Antoniadou, 2025). The chosen participants, comprising both students and lecturers with relevant exposure to ERT&L and load shedding, provided sufficient diversity and depth to meet the study’s objectives within a manageable and contextually appropriate sample size.

Throughout these interviews, the researcher used field notes on a notepad to record non-verbal cues and relevant observations related to the interview questions. The researcher also used the NVivo software to conduct a thematic analysis to a certain extent, a method well-suited for identifying, analysing, and

reporting patterns (themes) within data. Therefore, several processes were involved in thematic analysis, including becoming familiar with the data, creating preliminary codes, looking for themes, evaluating themes, defining and labelling themes, and creating the final report. The researcher used NVivo software for The use of both students and lecturers also allowed for data triangulation, enhancing the credibility of the findings by capturing multiple viewpoints within the same context. Additionally, validity was strengthened through triangulation of data sources, such as interview transcripts and field notes, alongside member checking, where participants reviewed and verified the accuracy of their responses. Prolonged engagement with the data through multiple readings and iterative coding during thematic analysis further ensured trustworthiness and rigour in the research process (Nowell et al., 2017). The study also complied with strict ethical guidelines, which included receiving ethics approval, obtaining participants' informed consent, ensuring voluntary participation, and ensuring confidentiality and anonymity.

5. Findings

This section delves into the actual findings derived from the collected data, which underwent thematic analysis and interpretation. The goal was to ascertain the relevance of these findings concerning the initial intent and purpose of the study, which aimed to discover the challenges HE students and lecturers faced when transitioning from face-to-face learning to ERT&L, as well as when faced with load shedding. Four key themes emerged as the framework for organising the discussions of the findings. The ensuing discourse provides a concise summary of these critical issues, incorporating participant perspectives and firsthand accounts.

5.1. Demographic Data

Table 1 below illustrates a broader range of participants' profiles (lecturers and students). The overall demographic data of the research participants includes their pseudonym, age, gender, language, and qualification.

Table 1: Overall demographic data of the participants

STUDENTS					**Level of study**
Pseudonym	**Age**	**Gender**	**Language**	**Qualification**	
Participant A	24	Female	isiXhosa	Postgraduate Diploma in Higher Education	5th year
Participant B	25	Female	Sesotho	Advanced Diploma in Civil Engineering	4th year level
Participant C	27	Male	Sepedi	Masters in business administration	6th year level
Participant D	25	Female	Sepedi	Postgraduate Diploma in Cost and Accounting Management	5th year level
Participant E	29	Male	isiZulu	Advanced Diploma in Safety Management	4th year level
LECTURERS					
Pseudonym	**Age**	**Gender**	**Language**	**Qualification**	**Years of experience**
Participant F	32	Male	Sepedi	Master of Fine Arts	7 years
Participant G	35	Male	Sesotho	Master in education	5 years
Participant H	40	Female	isiZulu	Master of Business	9 years

				Administration	
Participant I	29	Male	Sepedi	Master of Education in Higher Education	6 years
Participant J	33	Female	English	Master in Chemical Engineering	6 years

Theme 1: Network connection

Issues with internet connectivity emerged as a significant barrier for students and lecturers in the transition to online learning. Many students, particularly those from rural areas, faced persistent network instability, making it difficult to attend live classes or complete online assessments. Participant A noted, *"Since I come from a rural area, the network here is not stable, and sometimes it was difficult to participate in class because of the bad network and not even write online assessments as the system keeps on kicking me out."* Similarly, Participant B highlighted the challenge of accessing an internet connection, stating that, *"I couldn't join online classes due to not having an internet connection (WI-FI). When I used my mobile data, I had issues with finding a good network connection."* Some students sought alternative solutions, as Participant C explained, *"I had to make certain sacrifices, and I had to find a place in an urban area with a better internet connection….. so this issue made it difficult for me to join live discussions."* Others resorted to downloading recorded lectures at inconvenient times, with Participant D sharing that, "*One of the biggest challenges was a lack of access to reliable internet connection……I often resorted to downloading recorded lectures late at night after they were available to catch up on what had been discussed in class."*

Lecturers also faced similar struggles with unstable internet connections, technical difficulties, and broader infrastructural challenges such as load shedding. Participant F expressed frustration with connectivity disruptions, stating, *"Technological issues also became a challenge for me, particularly unstable internet connection, which usually disrupted my lessons."* Beyond internet problems, lecturers encountered barriers related to access to devices and online platforms, as Participant G noted that *"I faced issues with internet connectivity, access to devices, and familiarity with online learning platforms…., this created barriers to uploading and students accessing course materials, participating in live sessions, and submitting assignments."* The issue was further exacerbated by power outages, as highlighted by Participant H:

"On my side, I think that the challenges that we face range from connectivity issues whereby during the transition to online learning, we had to face challenges with connectivity and looking at times of load shedding, there's no electricity and you'll find it difficult to conduct your classes on an online platform."

Thus, it is apparent that these challenges collectively hindered effective teaching and learning, emphasising the need for improved digital infrastructure and support systems in online education, specifically in South Africa.

Theme 2: Load shedding

Load shedding posed a significant obstacle for students in adapting to online learning, disrupting class attendance, access to learning materials, and overall academic performance. Many students struggled with sudden power outages

during critical moments, as Participant A recalled, *"I remember one incident where I was in the middle of an important video conference for class, and suddenly the power went out. It was embarrassing and disruptive, and I had to quickly switch to using my mobile data to continue the meeting."* Similarly, Participant B highlighted the dual challenge of network instability and electricity cuts, stating that, *"The challenges I have encountered during the change from traditional classes to online learning due to COVID-19 was not being able to attend classes due to bad network and load shedding."* For students in rural areas, load shedding worsened network issues, making online participation nearly impossible. As Participant C explained, *"Since I come from rural areas, the network coverage was very bad because of load shedding……network towers work with electricity, and when there is no electricity, network is poor."*

Beyond connectivity issues, load shedding affected students' ability to use their devices and complete assignments. Some students relied on desktop computers, which became unusable during power cuts. Participant D expressed this frustration, stating,

"Load shedding was the most stressful issue because some of us were using desktop computers that rely on electricity. As a result, if there is load shedding, I cannot attend the classes." Another student expressed that *"I struggled with keeping my devices charged during load shedding, and it affected my ability to participate in online classes as well as assignments…it created a lot of stress and anxiety, particularly if I had deadlines to meet or exams to prepare for"* (Participant E).

Therefore, it can be deduced that these experiences elucidate the widespread impact of load shedding on students' education, underscoring the need for better infrastructural support and alternative learning solutions.

Theme 3: Adaptation to Emergency Remote Teaching & Learning

The sudden transition to online learning posed significant adaptation challenges for both students and lecturers. Many students found it difficult to navigate unfamiliar platforms like Zoom and Microsoft Teams, with Participant A admitting, *"Navigating and effectively utilizing these platforms initially proved a struggle."* Others, like Participant B, struggled with the shift from traditional face-to-face learning, stating, *"ERT&L impacted my academic performance as it was a new concept that everyone didn't know about."* The abrupt change left students feeling unprepared; as Participant D expressed, *"We were forced to adapt to this new change without any preparations."*

Similarly, lecturers had to rapidly adjust their teaching methods to online platforms. Participant I shared, *"I had to quickly adapt to new online teaching tools and platforms such as Microsoft Teams and Zoom, which required time and effort to learn and implement effectively."* This adjustment was particularly challenging for those unfamiliar with online teaching.

Beyond technical adaptation, engagement and interaction emerged as key challenges. Students missed the traditional classroom setting, with Participant C noting, *"My learning style is more of a student who likes going to campus, feeling the environment of other peers."* The lack of in-person interaction also made it harder

for lecturers to gauge student participation. As Participant G explained, *"I sometimes think when you are doing a lesson or you're teaching students, you find that it's much better or it's much more fulfilling if you can see the engagement."* The struggle to create an interactive online learning experience was echoed by Participant F, who stated, *"The lack of face-to-face interaction with lecturers and peers made it harder to ask questions, seek clarification, and engage in discussions."* These insights highlight the profound impact of the transition to online learning, emphasising the need for better preparation and strategies to enhance engagement in virtual environments.

Theme 4: Mechanism for future pandemics in higher education

To improve online learning and ensure better preparedness for future disruptions, both students and lecturers highlighted key areas for development. Strengthening digital infrastructure emerged as a top priority. Students called for investments in reliable learning platforms, high-speed internet, and accessible digital resources. Participant C stated, "*Our institution should prioritise developing vigorous online learning platforms and infrastructure,"* while Participant D emphasised that "*The institution should prioritise investments in robust digital infrastructure to ensure smooth and effective online education delivery."* Similarly, lecturers suggested integrating backup power solutions, with Participant G proposing that *"We must make sure that we have backup generators and solar panels installed within our institutions."*

Another crucial recommendation was enhancing preparation and engagement in online learning. Students urged universities to provide clearer guidance on using online platforms; as Participant B noted, "*The institution must offer clear and comprehensive information about online learning processes."* They also stressed the importance of fostering interactive learning environments, with Participant E suggesting, "*HE should create plans to encourage students' active involvement and participation."* On the lecturers' side, ongoing professional development was seen as essential. Participant I stated, "*Ongoing training and professional development for educators in online teaching methodologies and technologies are crucial,"* while Participant J emphasised the need for *"Better preparation and training for both students and educators in online learning methods."*

Broader pandemic preparedness was identified as a key area for improvement. Students and lecturers alike recommended proactive contingency planning, ensuring institutions are ready to transition smoothly to online learning during emergencies. Participant A proposed, *"Contingency plans for remote learning should be established well in advance,"* while Participant H underscored the need for *"Flexible preparedness plans by the healthcare system."* These recommendations collectively highlight the need for a well-rounded approach to digital education, ensuring institutions, lecturers, and students are fully equipped to navigate future challenges.

5. Discussions

The findings of this study highlight several challenges faced by students and lecturers in adapting to ERT&L during the COVID-19 pandemic, particularly in

the context of South Africa, where load shedding further exacerbated these difficulties.

The findings reveal that poor network connectivity was a major barrier for both students and lecturers. Those from rural areas particularly struggled with unstable connections, making it difficult to attend live sessions and complete assessments. These findings align with previous research, which has established that technological limitations and inadequate infrastructure hinder students' ability to participate in online learning environments (Adedoyin & Soykan, 2020; Doucet et al., 2020). The digital divide was evident, as students from marginalised backgrounds had significantly less access to stable internet and digital literacy training (Zhong, 2020; Kaeane & Molokomme, 2025).

Moreover, in the TOE framework, this issue relates directly to the technological component, which emphasises the need for reliable digital infrastructure. Misirli and Ergulec (2021) highlight the importance of internet stability and digital access in ensuring the effectiveness of online learning. However, the findings suggest that South African HEIs were unprepared for a transition to fully digital learning due to infrastructural deficiencies, highlighting gaps in the technological readiness aspect of the TOE framework.

The study also found that load shedding significantly disrupted learning activities, preventing students from accessing online classes, submitting assignments, and participating in discussions. Lecturers also faced difficulties in delivering lessons due to frequent power outages. These findings are consistent with Mesuwini and Mokoena (2024), who found that load shedding undermined the progress of digital education in South Africa. Similarly, Khan, Ayub, and Farooq (2022) reported that load shedding negatively impacted students' study schedules, concentration, and exam preparation.

Within the TOE framework, load shedding falls under environmental factors, which include external disruptions such as infrastructural limitations and socio-economic disparities (Alqahtani, 2016). The findings confirm that these external barriers significantly affected HEIs' ability to sustain digital learning. This is consistent with Yende (2024), who revealed that scheduled power outages widened the gap between students with access to alternative energy sources and those without, further intensifying the digital divide.

The findings also indicate that many HEIs lacked structured policies and contingency strategies to support students and lecturers during ERT&L. Some students had to find alternative locations with stable internet, while others resorted to downloading lectures at odd hours. Likewise, lecturers struggled with technological issues, indicating insufficient institutional support. This aligns with Mpungose (2020), who found that many HEIs lacked the necessary frameworks to ensure equitable access to education during the transition to online learning.

This aligns with the TOE framework, in particular, challenges relating to organisational capacity, which focuses on an institution's preparedness for

technological integration. The findings indicate that South African HEIs were inadequately equipped to support remote learning, reinforcing the conclusions of Iglesias-Pradas et al. (2021) that HEIs in developing countries often lack digital resilience strategies. The lack of alternative solutions for load shedding further underscores the absence of robust institutional policies for crisis-driven digital learning (Molokomme, 2024; Mashiyane et al., 2024; Molokomme et al., 2025).

Additionally, beyond technical difficulties, the study also found that students and lecturers experienced heightened stress and anxiety due to the rapid transition to online learning. The lack of peer interaction, increased workloads, and academic uncertainty contributed to feelings of isolation and burnout. Afzal et al. (2023) similarly found that these emotional burdens were common among students and faculty members during ERT&L. Hodges et al. (2020) noted that unplanned transitions often lead to pedagogical challenges, further exacerbating stress levels.

However, the TOE framework does not explicitly address psychological factors, but these findings suggest an extension of the model to include human-centric elements. The organisational aspect of TOE should encompass mental health considerations, as institutional readiness should involve not only technological and infrastructural preparedness but also mechanisms to support the well-being of students and staff.

6. Conclusion

This study aimed to explore the difficulties experienced during ERT&L and load shedding in HE, with a specific focus on a HEI in the Vaal Region of Gauteng province, South Africa. The study has provided valuable insights into the challenges HE students and lecturers faced when transitioning from face-to-face learning to ERT&L and during times of load shedding. Several key findings have emerged through a comprehensive analysis of data and feedback from students and lecturers. However, the researcher identified significant challenges faced by students and lecturers, including access to technology, internet connectivity issues, load shedding, mechanisms for future pandemics, the experiences of students and lecturers on ERL, and adapting to online learning environments. The effectiveness of ERT&L in enriching students' learning experiences depends not just on students' proficiency or module outcomes but also on collaborative learning and innovative teaching methods employed by lecturers.

A strong online educational environment is crucial to ensure that students can access the online learning platform. Due to economic or logistical challenges, insufficient access to technology may impede students' ability to fully engage in the practical components of physical education.

However, based on the findings of this study, the researcher recommended several key strategies to address the identified challenges. These include the need for HEIs to invest in robust digital infrastructure to ensure smooth and effective online education delivery. This includes not only high-speed internet

access, adequate devices for students and faculty, and reliable learning management systems, but also the installation of campus-wide Wi-Fi, provision of community-based hotspots in underserved areas, and exploration of off-grid solutions such as solar-powered digital hubs or battery backup systems. Furthermore, universities should work with telecommunications providers to zero-rate academic sites and consider subsidy or loan schemes to support students in acquiring digital devices. In addition, HEIs should provide comprehensive training and support for faculty members transitioning to online teaching methodologies. This training should cover technical skills, pedagogical strategies suited for virtual environments, and approaches to increase student engagement in both synchronous and asynchronous modes.

The adoption of hybrid or blended learning models is also strongly recommended to mitigate the academic disruptions caused by persistent loadshedding. This includes the use of pre-recorded lectures, downloadable content, and flexible, modular course designs that allow for continued learning during periods of interrupted connectivity. In addressing equity and accessibility, HEIs must ensure that online learning platforms and resources are inclusive and accessible to all students, particularly those with disabilities or limited access to technology. Measures such as assistive technologies, alternative assessment formats, and the creation of accessible course materials should be implemented, alongside adherence to universal design and accessibility standards. Support services must also be provided for students requiring accommodations.

Finally, institutional policy reforms should include the development of crisis-responsive digital education frameworks, as well as the establishment of monitoring and evaluation systems to track the effectiveness of these digital interventions. HEIs are encouraged to create "digital inclusion task teams" to identify at-risk students and tailor support, accordingly, ensuring no learner is left behind during disruptions to traditional learning systems.

Furthermore, the study recommends that future research expand its scope to include a wider range of South African universities across different provinces. This should involve a comparative investigation of comprehensive, traditional, and universities of technology (UoTs) to identify both common and unique challenges related to ERT&L. Employing mixed-method research approaches and incorporating larger, more diverse participant samples will enhance the depth and generalisability of future findings. Researchers are also encouraged to explore regional variations in digital infrastructure and the differential impact of load shedding on HEIs. Additionally, future studies could evaluate the effectiveness of hybrid learning models as a mitigation strategy, investigate the long-term academic and psychological effects of prolonged infrastructural disruptions, and assess institutional innovations, such as investments in solar energy and offline learning technologies. These expanded investigations would provide valuable insights for developing sustainable, inclusive, and crisis resilient HE systems in South Africa.

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