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Understanding the challenges of emergency remote teaching for students at a South African university of technology post-COVID-19

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Abstract: The COVID-19 pandemic forced higher education institutions (HEIs) to transition from traditional face-to-face learning to emergency remote teaching (ERT). This study explores the challenges faced by fourth-year students at the University of Technology (UoT) in Gauteng during this transition, particularly in the post-pandemic context. This study addresses critical gaps in the existing literature on ERT challenges experienced by students at a South African UoT, particularly focusing on the contextual factors and diverse student populations. Underpinned by the Technological Determinism Theory (TDT) and Constructivist Learning Theory (CLT), the study examines how technology shaped students' learning experiences and how they constructed knowledge in an online environment. Using a phenomenological qualitative approach, data were collected through semi-structured interviews with twelve fourth-year students who experienced both face-to-face and online learning. Thematic analysis revealed key challenges, including unreliable internet connectivity, lack of digital resources, and disruptions caused by load shedding. The findings emphasize the need for HEIs, especially UoTs, to enhance internet infrastructure, provide adequate digital resources, and implement robust training programs for students and staff. This study contributes to the growing body of research on post-COVID-19 ERT challenges in developing countries and provides practical recommendations for enhancing online learning implementation.

Keywords: *Challenge, Emergency remote teaching, E-learning, Higher education, Students, University of technology.*

1. Introduction

The COVID-19 pandemic disrupted education on an unprecedented scale, forcing higher education institutions (HEIs) to make rapid and often unplanned shifts from traditional face-to-face instruction to emergency remote teaching (ERT). While this transition was initially seen as a temporary measure to ensure continuity of learning, its long-term impact has been profound, exposing systemic weaknesses in digital readiness, infrastructure, and student support [1]. However, while some institutions in South Africa had already implemented electronic learning (E-learning/online learning) before COVID-19, challenges persisted, ranging from connectivity issues, particularly for students in the rural areas and the disruptions exacerbated by frequent loadshedding [2]. However, this abrupt shift was not merely a technical or logistical challenge for many students but a fundamental reconfiguration of their learning experience, one that exacerbated existing inequalities and created new barriers to academic success Hough, et al. [3].

Hodges, et al. [4] provide a clear distinction between e-learning and ERT which differs significantly in their design and implementation. E-learning is a well-structured, long-term educational strategy that incorporates planned digital resources, faculty training, and student support to ensure effective e-learning. In contrast, ERT is a temporary and reactive response to a crisis, implemented with limited preparation and often lacking essential pedagogical considerations. Thus, it can be deduced that

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understanding the challenges is crucial for ensuring that HEIs, particularly in developing countries, are better prepared to successfully implement ERT when faced with pandemics or other disruptions. By identifying and addressing gaps in digital infrastructure, training, and student support, institutions can build resilience and ensure a smoother transition to remote learning in future emergencies [5].

HE in South Africa is characterised by a highly diverse student population, many of whom come from underprivileged backgrounds with limited access to reliable internet, digital devices, and conducive learning environments [6]. According to [7] ERT was introduced as a crisis response, and it inadvertently amplified the digital divide, with students from rural and low-income urban areas facing disproportionate challenges. South African Universities of Technology's (UoTs), which traditionally emphasise hands-on, practical learning, faced even greater difficulties in adapting technical and laboratory-based curricula to an online format [8, 9].

Moreover, it is worth noting that despite the wealth of research on e-learning and online education, the sudden implementation of ERT presents a unique set of challenges that distinguish it from conventional online learning. Unlike structured and pedagogically sound online courses, ERT was reactive, implemented with limited preparation, and often lacking in adequate digital resources, staff training, and institutional support structures [4]. As HEIs emerge from the crisis, it is crucial to examine the implications of ERT, particularly for students who navigated their final years of study under these conditions.

Additionally, while previous studies have explored ERT challenges in South African HEIs, much of the research has focused on broad institutional responses or generalised student experiences [6, 8, 10]. Most of these studies have gathered data from a broad range of students without specifically examining the distinct challenges faced by those who began their academic journey during the shift from face-to-face instruction to ERT. However, there remains a critical gap in understanding how specific cohorts, particularly fourth-year students, navigated this transition. Fourth-year students who began their academic journey in 2020 experienced ERT from its initial implementation, navigating the transition throughout their studies until their final year in 2024, when institutions started shifting toward more structured online learning. This group is particularly significant as they reached a critical academic juncture, balancing final assessments, work-integrated learning, and preparation for the job market. Unlike other students, who may have had prior exposure to online learning, fourth-year students faced the dual challenge of adapting to an evolving digital learning environment while managing the intensified demands of their final year.

Moreover, the post-pandemic era presents new challenges, as HEIs attempt to integrate lessons from ERT into their long-term teaching strategies. The effectiveness of these efforts is contingent upon addressing key issues such as digital literacy, academic dishonesty in online assessments, the adequacy of student support services, and the sustainability of digital infrastructure investments [11]. Thus, by focusing on the lived experiences of fourth-year students, this study aims to contribute nuanced insights into the successes and failures of ERT at South African UoTs, thereby informing future educational policies and practices.

Furthermore, since global HE landscapes continues to evolve, understanding the challenges posed by ERT is essential for shaping resilient and inclusive digital learning environments [12]. This study seeks to bridge the knowledge gap by providing empirical evidence on how South African UoTs can better support students in future digital transitions, ensuring that remote learning does not become a vehicle for deepening educational inequalities but rather a means to foster innovation and accessibility in HE [5].

2. Literature Synthesis

ERT has become an essential component of modern HE, yet it presents significant challenges that impact students, lecturers, and institutions [9]. The transition to ERT in HEIs has exposed several challenges. Internet connectivity, with concerns ranging from poor internet quality and reliability to a lack of connectivity are some of the things, exacerbated by load shedding Letseka, et al. [2]. Ahmed and

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Opoku [13] emphasise that internet accessibility remains one of the primary obstacles for both students and lecturers, significantly impacting the success of remote learning. Bozkurt, et al. [14] argue that service interruptions disrupt the learning process, hindering students' ability to access educational materials and engage in online classes. However, Zhang [15] presents an opposing view and posits that students residing near HEIs experience fewer connectivity challenges, indicating that the severity of this issue is context-dependent. Ahmed and Opoku [13] and Bozkurt, et al. [14] allude to the fact that internet connectivity remains a significant barrier, especially for students in remote areas. This is further exacerbated during assessments or live classes when power outages disrupt participation.

Additionally, Favale, et al. [16] state that HEIs often fail to provide digital devices to students, placing additional strain on those from disadvantaged backgrounds. Phan, et al. [17] reinforce this, arguing that inadequate resource allocation prevents students from fully participating in e-learning activities. Gumantan, et al. [18] further add that such resource inadequacies contribute to lower pass rates and reduced motivation among students.

Moreover, Bhat [19] asserts that many HEIs in developing countries were unprepared for the transition to ERT and had not planned for its implementation. This lack of readiness negatively impacts students' academic progression, as Gumantan, et al. [18] caution that students may pass courses without truly understanding the content, affecting their future career prospects in the global market. Thus, it is evident that this may highlight that institutional unpreparedness was a widespread issue during the rapid shift to online learning, affecting students' educational experiences and long-term competencies [9].

However, Valızadeh [20] identifies laziness, disregard for academic rules, and lack of motivation as primary reasons for online cheating. This highlights a critical concern regarding the integrity of online assessments. Du Plessis and van der Westhuizen [10] stress the importance of using lockdown browsers and proctoring software to maintain academic integrity and ensure that submitted work is authentic. While these mechanisms are advocated, Valızadeh [20] challenges the notion that academic dishonesty is unique to online settings, arguing that cheating is equally prevalent in traditional assessments. However, Janke, et al. [21] and Balderas and Caballero-Hernández [22] report a noticeable rise in academic dishonesty during the shift to ERT, suggesting that the lack of direct supervision plays a role. Rettinger and Gallant [23] emphasize the need for HEIs to prioritise academic honesty through proctoring software and timed assessments [10].

Furthermore, the lack of social interaction in ERT is another major drawback identified in the literature. Lillejord, et al. [24] argue that the absence of direct interaction in online classes leads to student disengagement and demotivation due to inadequate guidance. Similarly, Bhat [19] identifies reduced engagement as a fundamental disadvantage of e-learning and ERT. Iftakhar [25] postulates that overcoming ERT challenges can better equip students, lecturers, and HEIs for future educational shifts, ensuring e-learning and ERT remains a viable and effective mode of instruction. Given that UoTs are expected to lead in technological advancements, their struggles with implementing e-learning are particularly concerning [26, 27].

While there is significant agreement among scholars regarding the challenges of ERT such as internet connectivity, lack of resources, institutional unpreparedness, academic dishonesty, and reduced social interaction. Zhang [15] suggests that students near HEIs experience fewer connectivity challenges. Ahmed and Opoku [13] and Bozkurt, et al. [14] in the same vein, emphasises that internet accessibility remains a primary obstacle for students and lecturers alike. Similarly, while academic dishonesty is widely acknowledged as a growing concern. Valızadeh [20] challenges the assumption that online learning exacerbates cheating more than traditional settings. Therefore, it is apparent that understanding and addressing these challenges is essential to ensuring the long-term success of ERT and improving educational access in developing regions.

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3. Theoretical Framework

This study is underpinned by two theories that are explained next.

Technological Determinism Theory (TDT), coined by Marshall McLuhan in 1964 and later expanded by scholars such as Daniel Chandler in 1995, suggests that technology plays a fundamental role in shaping society, including education. The theory argues that technological advancements dictate human behavior and societal structures, often independent of social, economic, or cultural influences [28]. In the context of ERT in South African UoT post-COVID-19, this theory is relevant in explaining how the abrupt shift to ERT was primarily driven by technological necessity rather than pedagogical considerations [29].

The implementation of online learning platforms, video conferencing tools, and digital assessment systems reshaped how students engaged with academic content. However, this rapid technological transition also exposed deep-seated challenges. Many students faced difficulties accessing reliable internet, digital devices, and conducive study environments [30]. The digital divide, particularly among economically disadvantaged students, became a critical barrier, highlighting the unequal impact of technology-driven education. According to Van Deursen and Van Dijk [31] access to technology does not automatically translate to effective learning, rather students require adequate digital literacy and infrastructure to benefit from these tools.

Furthermore, Technological Determinism suggests that technology alone dictates how education evolves, often overlooking contextual challenges such as students' readiness, institutional support, and socio-economic disparities [32]. The assumption that all students could seamlessly transition to ERT ignored the reality that many lacked prior exposure to digital learning environments. As a result, rather than enhancing learning, the forced reliance on technology created new obstacles, reinforcing existing educational inequalities within South African universities of technology.

3.1. Constructivist Learning Theory

Constructivist Learning Theory (CLT), primarily developed by Jean Piaget in 1950 and Lev Vygotsky 1978, emphasizes that knowledge is actively constructed through experience, social interaction, and problem-solving [33]. This theory contrasts with traditional passive learning models by advocating for student-centered approaches that encourage engagement and collaboration. In the context of ERT, the shift to online education disrupted many of the principles central to constructivism, particularly for UoT which rely heavily on experiential learning.

One of the key challenges of ERT was the limited opportunity for hands-on learning and collaborative engagement [34]. Practical subjects, which form the core of technical education, could not be effectively translated into virtual settings, leading to gaps in students' skill development [4]. Additionally, the absence of face-to-face interactions diminished the social learning component, which Vygotsky [35] identified as essential for cognitive development. In traditional classroom settings, students learn through peer discussions, group work, and guided mentorship, but these elements were largely absent in remote learning environments [36].

Another challenge was students' struggle with self-directed learning. Constructivism assumes that learners actively engage with content and construct meaning through exploration, yet many students lacked the necessary digital literacy and study discipline to navigate online learning effectively [37]. The abrupt transition to remote education placed a greater responsibility on students to manage their learning, often without adequate support structures. As a result, many students experienced difficulties in adapting to self-paced online instruction, further highlighting the limitations of ERT in fostering a constructivist learning experience [38].

4. Research Methodology

The study employed a qualitative research approach, specifically following a phenomenological qualitative research design, to explore the lived experiences of students transitioning to ERT at a UoT in South Africa. This approach was chosen as it allows for an in-depth understanding of participants'

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experiences, perceptions, and challenges related to ERT [5]. The research was conducted within the interpretivist paradigm, which acknowledges the subjective realities of participants and their individual experiences [39]. The interpretive paradigm was considered suitable as it enabled the researcher to capture diverse perspectives and provide rich, detailed insights into the phenomenon [40]. The target population comprised fourth-year students at the UoT, given their direct exposure to ERT challenges. The study employed a non-probability purposive sampling technique to select 12 fourth-year students (three from each of the four faculties at a UoT), ensuring representation from all four faculties. This sample size was deemed appropriate to achieve data saturation, as suggested by Creswell and Poth [41]. Inclusion criteria ensured that participants had first-hand experience of the transition to ERT and met specific academic and professional qualifications [42].

Data were collected through semi-structured interviews using an interview guide, allowing for flexibility in responses while ensuring consistency in data collection [5]. Interviews were conducted in a private setting on the UoT premises, ensuring confidentiality and voluntary participation through informed consent. The researcher used an audio recording device, with participant permission, to ensure accurate transcription and analysis. Data were analysed using thematic analysis, a method that identifies, analyses, and interprets patterns within qualitative data [43]. Ethical considerations were strictly adhered to, with approval obtained from the Faculty Research Ethics Committee, and gatekeeper permission granted by the UoT.

5. Findings

The findings of this study have revealed several key themes regarding fourth-year students' experiences with the challenges of ERT at a UoT. The section begins with an overview of the demographic profile of the participants, providing essential context for understanding their perspectives. This is followed by presenting the key themes that emerged from the data, offering a structured insight into the recurring patterns and challenges identified by fourth-year students. Below is a summary of the demographic profile of fourth-year students.

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Table 1.
Demographic profile of fourth-year students.

ID	Gender	Year of birth	Town of residence	Highest qualification	Qualification registered for	Faculty	The first year of registration	Preferred mode of learning
FYS1	Female	2000	Vanderbijlpark	Diploma in Public Relations Management	Advanced Diploma in Public Relations Management	Human Sciences	2020	Contact
FYS2	Female	2000	Vanderbijlpark	Diploma in Public Relations Management	Advanced Diploma in Public Relations Management	Human Sciences	2020	Contact
FYS3	Female	1998	Vanderbijlpark	Diploma in Public Relations Management	Advanced Diploma in Public Relations Management	Human Sciences	2020	Contact
FYS4	Female	1999	Vanderbijlpark	National Diploma in Marketing	Advanced Diploma in Management	Management Sciences	2020	Contact
FYS5	Male	1999	Vanderbijlpark	Diploma in Marketing	Advanced Diploma in Marketing Management	Management Sciences	2020	Contact
FYS6	Female	1996	Vanderbijlpark	National Diploma in Marketing	Advanced Diploma in Marketing Management	Management Sciences	2020	Contact
FYS7	Female	2000	Vanderbijlpark	Diploma in Analytical chemistry	Advanced Diploma in Chemistry	Applied and Computer Science	2020	Contact
FYS8	Female	1995	Vanderbijlpark	Diploma in Analytical chemistry	Advanced Diploma in Chemistry	Applied and Computer Science	2020	Contact
FYS9	Male	1999	Vanderbijlpark	Diploma in Analytical chemistry	Advanced Diploma in Chemistry	Applied and Computer Science	2020	Contact
FYS10	Female	1999	Vanderbijlpark	Diploma in Computer Sciences	Advanced Diploma in Computer Systems Engineering	Engineering and Technology	2020	Contact
FYS11	Male	2000	Vanderbijlpark	Diploma in Chemical Engineering	Advanced Diploma in Chemical Engineering	Engineering and Technology	2020	Contact
FYS12	Male	1992	Vanderbijlpark	Diploma in Mechanical Engineering	Advanced Diploma in Mechanical Engineering	Engineering and Technology	2020	Contact

Note: Key: FYS = Fourth Year Student.

The findings from the fourth-year students are discussed next.

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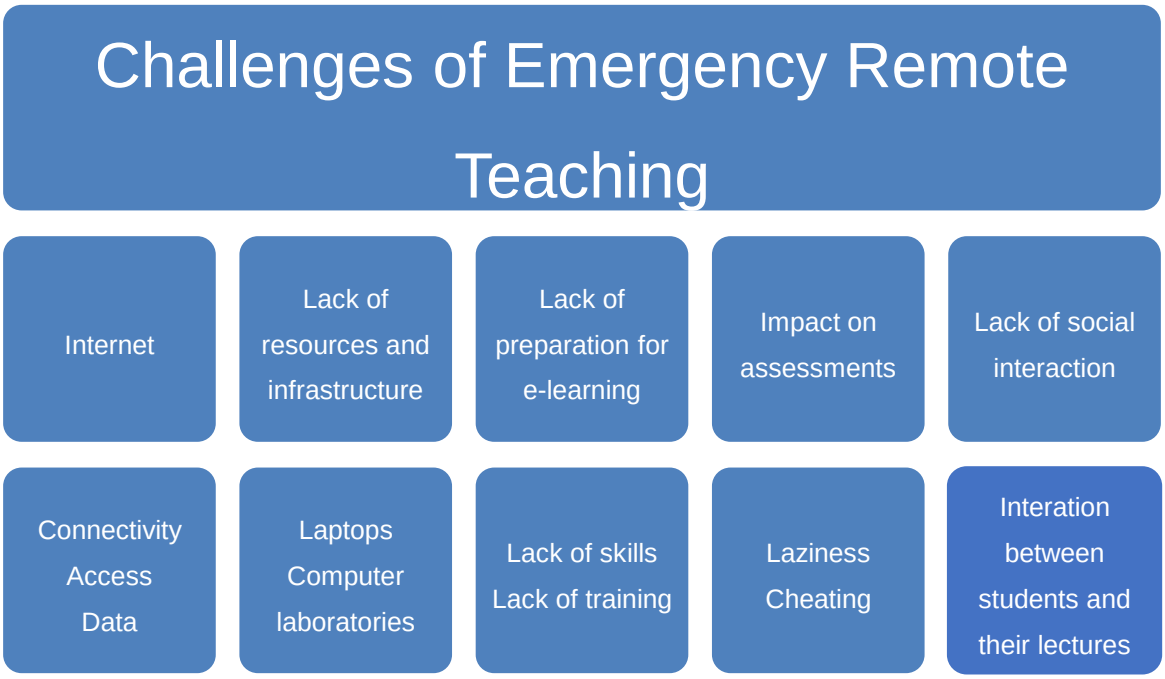

Figure 1.
Challenges faced by Students.

5.1. Challenges Of Emergency Remote Teaching Faced by Students

Internet: Fourth-year students from a UoT believe that the challenges of ERT are related to the quality and reliability of internet connections. It was highlighted that connectivity is a huge challenge and FYS2 indicated that *"I had problem with Internet connection and data"*. FYS4 also states that *"Most of the time, the internet was a challenge... you find that it's not stable"*. FYS5 noted that *"There was no Internet connection"*. Considering the fact that this is a UoT students believe that such issues would have been avoided since a UoT should be more advanced in technology. Two students indicated as follows: *"We are definitely struggling with Internet connection. I feel that as a UoT we … should have Internet access everywhere on campus"* (FYS3) and *"The challenges again is that we do not have a strong internet and when you do not have strong internet connection how do you go about it you just have to … figure things out on your own so that is why e-learning is a challenge that I can mention right now"* (FYS10).

Some students have highlighted the issue of Wi-Fi connections at a UoT and FYS5 indicated that *"There was no internet connection"* and FYS1 noted, *"We had to face connection problems and network breakdowns where some days you find yourself having to attend and you can't hear the lecturers, you just hear them breaking due to poor network or poor Wi-Fi connection"*.

Additionally, one of the other major challenges faced by students in ERT is poor network connectivity, which disrupts their ability to attend classes smoothly. As FYS8 explained, *"One of the challenges of e-learning is that there is network problems which affect one from attending classes smoothly without any problems and when there is loadshedding, you can't attend since you will face connectivity issues due to network."* Similarly, FYS6 highlighted the difficulties experienced at VUT, stating, *"Connectivity issues, we cannot connect due to poor network, and here at VUT, we use Eduroam as a Wi-Fi, and it is very poor."* This issue is further emphasised by FYS11, who noted, *"There are technical constraints such as limited internet access due to issues with the Wi-Fi which is very poor and also bad network coverage particularly during the times of loadshedding."* FYS12 also pointed out the lack of institutional support for data provision, stating, *"As students we are faced with uh the problem of internet connection we do not have a strong internet connection here at VUT. We don't have data the institutions does not provide us with data and we have loadshedding in SA."*

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Thus, these excerpts collectively highlight the persistent technical barriers that hinder students' access to online learning, particularly in the context of unreliable Wi-Fi, poor network coverage, and frequent loadshedding.

Lack of resources and infrastructure: Students from the UoT expressed concerns about the lack of support in terms of receiving laptops, data, and access to sufficient computers within the institution, highlighting the limited infrastructure available for ERT. As FYS1 stated, *"Some students don't have laptops,"* while FYS3 similarly pointed out, *"Not everyone had access to devices."* The shortage of essential resources was further emphasised by FYS4, who noted, *"There was a shortage of laptops and computer laboratories."* Additionally, FYS12 highlighted the inadequacy of institutional facilities, stating, *"We do not have sufficient or enough laboratories in our institution."* This lack of infrastructure posed significant challenges for students, particularly during assessments, as FYS6 pointed out, *"You can't write tests on your phone, you need a computer."* These concerns illustrate the broader issue of inadequate institutional support, which hindered students' ability to fully engage in online learning.

Lack of preparation for e-learning: Students from the UoT believed that the abrupt transition to ERT during the pandemic, without adequate preparation, created numerous challenges as they were unfamiliar with online platforms and tools. Expressing their frustration, FYS1 stated, *"We were not prepared at all …. It was just thrown at us,"* while FYS2 echoed this sentiment, saying, *"We were caught off guard."* The sudden nature of the shift was further emphasised by FYS4, who remarked, *"It was a sudden thing….we were not ready for it."* Similarly, FYS6 highlighted the lack of training and preparedness, stating, *"We were just forced to do e-learning, we were not trained, and we were not prepared."* FYS7 reinforced these concerns, simply stating, *"Well, it is because we were not prepared for it."* These reflections underscore the challenges students faced due to the institution's lack of readiness for ERT.

In addition, students highlighted the issues around lack of support where it was indicated that *"there is limited access to electronic devices"* (FYS5) and the *"lack of support with the necessary resources"* (FYS8). Similarly, FYS11 stated that there is *"lack of necessary digital literacy skills and also lack of resources"*, while one student stated that *"these e-learning devices are very costly"* (FYS10). Furthermore, one student stated the need for a UoT to provide proper training for them before transitioning to ERT and the students indicated that *"No one was really prepared for it, so when it was brought to us as students, no one was really taught how to use certain stuff"* (FYS9).

Impact on assessments: The students have highlighted both positive and negative impacts on assessments due to e-learning. Students from a UoT indicated concerns about becoming lazy and relying too heavily on notes and stated as follows: FYS12*: "It made me to be lazy with my school work."* Other students added that FYS2*: "[E]RT was challenging because it's like you're just writing and you're writing because you're thinking about the open notes in front of you"* and FYS3 stated that *"There was an increased possibility of copying because everything was open notes"*, while one student mentioned that *"My grades dwindling they did dwindle"* (FYS1). Moreover, one student highlighted the lack of understanding of the content and FYS7 indicated that *"Most of the assessments we wrote, we passed, yes, but then there's no […] we have no knowledge of those assessments"*.

Lack of social interaction: Students from a UoT believed that one of the major disadvantages of ERT was the reduced social interaction among students and lecturers. Highlighting this concern, FYS1 stated, *"You don't have the social interaction with the other students and with the lecturers."* Similarly, FYS4 expressed the loss of peer connections, saying, *"You miss socialising with friends."* FYS6 emphasised the impact on academic collaboration, noting, *"You don't meet up with friends to discuss schoolwork."* The lack of interpersonal engagement was further reinforced by FYS10, who remarked, *"There is a lack of social interaction between students,"* and FYS11, who added, *"There's limited social interaction with other peers."* These reflections illustrate how the transition to ERT diminished opportunities for meaningful engagement with both peers and lecturers.

Students from a UoT also believed that it is important for the UoT to address the challenges of ERT to be prepared for future pandemics and they have indicated that, *"They need to come up with a plan,*

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especially if something like this happens again" (FYS1) and that: *"It should be improved for the future […] as we are moving into the fourth industrial revolution"* (FYS3), and that will be *"For the effectiveness of e-learning, so that we don't face service interruptions"* (FYS4). Additionally, one student mentioned that *"We can be well prepared and trained for e-learning so that when we are faced by the similar situation, we will be able to shift swiftly to online learning smoothly without experiencing this challenges"* (FYS8). Also FYS9 mentioned that this will ensure *"[T]hat there is a smooth operation of ERT"*. Also, FYS12 indicated that this will ensure that *"[T]he institution is well prepared for ERT in the future"*. Furthermore, it was indicated by two students that a UoT should look at addressing these challenges so that *"The institution can be prepared for future pandemics"* (FYS5) and that *"They need to plan better for the future…. so that this similar issues are not faced in the future or so that there is a smooth flow of e-learning and ERT post-COVID-19"* (FYS6).

6. Discussions

The findings from students have pointed out issues around internet connectivity and technical difficulties as major challenges for ERT at the UoT, despite its technological focus. Specific issues raised include poor internet quality and reliability, lack of connectivity in some areas of campus, technical problems with the university's Wi-Fi network, and loadshedding, which disrupts access to online learning. These challenges significantly impact students' ability to engage in e-learning or ERT, as highlighted by Ahmed and Opoku [13], who emphasise that internet connectivity is a primary obstacle for both students and lecturers. The TDT, which posits that technological advancements shape societal structures and human behavior supports this finding [44]. Inadequate technological infrastructure limits students' ability to participate in digital learning environments, reinforcing the notion that access to technology dictates educational success. Furthermore, disruptions caused by service interruptions hinder students from accessing educational materials and online classes [14]. However, this finding contrasts with Zhang [15] who noted that students residing closer to HEIs experience fewer connectivity issues. Thus, while a UoT is expected to be technologically advanced, students still struggle with connectivity, particularly during power outages [5].

Another major concern raised by students was the lack of necessary resources for ERT. Many students reported not receiving adequate support, including digital devices, which hindered their ability to engage in online learning. Literature supports this, as HEIs often do not provide digital devices to students [16]. This aligns with the CLT, which emphasises that learning is an active process requiring proper tools and resources to facilitate knowledge construction [45]. Without adequate resources, students face barriers to active engagement, leading to lower participation rates and academic performance [17]. The lack of digital access can also contribute to student demotivation and high dropout rates Gumantan, et al. [18] highlighting the importance of technological provision in fostering an inclusive learning environment.

Students also expressed concerns about the unpreparedness of the UoT in implementing ERT. They indicated that the transition was imposed on them without adequate preparation, making it difficult to adapt. This finding is corroborated by Bhat [19] who highlights that many HEIs in developing countries were caught off guard and had no prior plans for ERT implementation. From a Technological Determinism perspective, this suggests that technological adoption, when imposed without sufficient readiness, can lead to ineffective learning experiences. Furthermore, the lack of preparation may result in students passing courses without fully understanding the content, which can negatively impact their competitiveness in the global market [18]. CLT further supports this by emphasising the need for scaffolded learning experiences where students gradually develop knowledge through structured support. The absence of a well-prepared ERT structure deprives students of the necessary guidance and feedback essential for meaningful learning [30].

The findings also revealed that ERT has affected students' motivation and academic integrity. Students admitted to becoming lazy, relying solely on notes, and engaging in cheating during online assessments. Valızadeh [20] supports this, stating that many students in HEIs cheat due to laziness, lack of respect for academic rules, and disinterest in studying. This highlights the necessity for

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technological interventions, such as lockdown browsers and proctoring software, to uphold academic integrity [10]. From a Technological Determinism perspective, the presence or absence of monitoring tools significantly influences students' adherence to academic standards. Constructivist Learning Theory also indicates that active engagement, rather than passive consumption of notes, is crucial for effective learning. When students rely solely on external resources without engaging in critical thinking and problem-solving, they fail to construct meaningful knowledge [36].

A significant drawback of e-learning highlighted by students was the lack of social interaction. Many expressed missing in-person discussions and the opportunity to socialize with peers. Lillejord, et al. [24] note that a lack of participation in online classes can lead to demotivation and higher dropout rates due to inadequate guidance and reduced direct interaction. The CLT underscores the importance of collaborative learning, where students engage in discussions and group activities to construct knowledge together Vygotsky [35]. Without interactive components, students may struggle to stay engaged and may find online learning isolating. Bhat [19] further supports this by stating that ERT makes students less engaged in the content, reinforcing the need for social learning elements in digital education.

Students also stressed the importance of addressing e-learning challenges to ensure that HEIs are better prepared in the future. Iftakhar [25] highlights that resolving these issues can enhance students' and lecturers' readiness for future educational disruptions and pandemics, making e-learning a more effective and sustainable model. The fact that these challenges persist at a UoT is particularly concerning, as UoTs are expected to be at the forefront of technological innovation [26, 27]. According to the TDT, the failure to provide adequate technological solutions in a technologically driven institution contradicts the expected influence of technology on educational advancement. Therefore, addressing these challenges will not only enhance the quality of e-learning but will also align with the constructivist approach by ensuring that students have the necessary tools, resources, and support systems to engage meaningfully with their education.

7. Conclusions

The aim of this study was to explore the challenges faced by HEIs, specifically a UoT in South Africa in adopting ERT and to analyse how these challenges impact students' learning experiences. The findings reveal that while ERT has become an essential mode of instruction, particularly in times of crisis, its implementation presents several obstacles that hinder its effectiveness. The most significant issues include poor internet connectivity, lack of institutional support, academic dishonesty, and reduced social interaction. Furthermore, the study highlights that many HEIs were unprepared for the sudden shift to online learning, which further compounded these challenges.

Additionally, institutional unpreparedness resulted in inadequate resource allocation, leaving many students without the necessary devices and support to engage effectively in e-learning. Academic dishonesty also surfaced as a growing concern, as online assessments often lack proper monitoring mechanisms. The absence of face-to-face engagement further contributed to student disengagement and demotivation. While some scholars argue that certain connectivity issues are context-dependent, the overall findings suggest that ERT remains a struggle for students, particularly those at UoTs, which are expected to lead in digital innovation. Addressing these challenges is essential for ensuring the long-term success of online learning and improving the accessibility and quality of HE.

However, based on the findings, the researcher recommends that HEIs take proactive steps to enhance the effectiveness of e-learning and ERT. Firstly, improving digital infrastructure should be a priority. HEIs should collaborate with internet service providers and government agencies to expand network coverage and offer subsidised or zero-rated data packages for students. Ensuring reliable and affordable internet access will enable students to participate in online learning without disruptions.

Additionally, institutional support must be strengthened to provide students with the necessary resources for remote learning. HEIs should also allocate funding for digital devices, especially for

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students from disadvantaged backgrounds. Furthermore, financial aid programs should be expanded to include provisions for acquiring essential e-learning tools, such as laptops and mobile data.

To uphold academic integrity, institutions should implement strict monitoring systems for online assessments. AI-based proctoring software, timed exams, and plagiarism detection tools should be integrated into online platforms to minimise cheating. In addition, HEIs should promote a culture of academic honesty by educating students on ethical learning practices. Moreover, capacity-building programs for both lecturers and students should be implemented to ensure digital literacy and adaptability. Regular workshops and training sessions on online teaching strategies, assessment methods, and student support services can enhance the effectiveness of remote learning.

For future studies, researchers should explore the long-term impact of ERT on student performance and retention rates. Additionally, further studies could investigate how different HEIs, particularly those in rural and urban settings, have adapted to online learning and what strategies have proven most effective. Comparative studies across multiple institutions and countries could also provide deeper insights into best practices for remote teaching in HE.

Thus, by addressing these challenges through targeted interventions, HEIs specifically UoTs can create a more inclusive and efficient e-learning environment, ensuring that online education remains a viable and effective mode of instruction, even beyond emergencies.

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Institutional Review Board Statement:

This study was conducted following ethical guidelines and was approved by the Institutional Review Board of a UoT. Ethical clearance was obtained under the reference number FREC/HS/24/03/2023/6.1.11. In addition, a gatekeeper letter was secured to ensure proper authorisation for data collection. The study adhered to ethical principles, including voluntary participation, informed consent, confidentiality, and the right to withdraw at any stage without penalty.

Transparency:

The authors affirm that the findings presented in this study are based on rigorous academic research and accurately reflect the data collected. No aspects of the research process were manipulated or altered to influence the results. The data, methodology, and interpretations have been presented with full transparency, ensuring the integrity and reliability of the study.

Competing Interests:

The authors declare no conflicts of interest related to this study. There were no financial, personal, or professional relationships that could have influenced the research process, findings, or interpretations.

Authors' Contributions:

The main author was responsible for conceptualizing the study, conducting the literature review, designing the methodology, collecting and analysing data, and drafting the manuscript. The two co-authors served as supervisors, providing guidance, critical feedback, and scholarly oversight throughout the research process. Their contributions were instrumental in refining the study's focus, ensuring academic rigor, and enhancing the overall quality of the research.

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