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South African TVET Students' Perceptions of Their Online Learning Experiences and Challenges: A Pilot Study

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Abstract. Learning in Technical and Vocational Education and Training (TVET) has been largely conducted through conventional methods. However, today, where information and communication technology plays a major role in people's daily lives, learning now relies on how students respond to literate teaching and learning technologies. The unavailability of online learning technologies in the TVET sector continues to underplay its value in breaking long-standing learning barriers such as class sizes and timetabling. The challenge is its adoption in TVET, which is still in its infancy compared to universities. Therefore, online learning is gaining momentum as a pedagogical tool in the TVET sector. The paper aimed to discuss TVET students' experiences during online learning. The study focused on how online learning impacts students' learning experiences in the TVET sector. A qualitative approach was used, and data were gathered from 25 engineering students using Google Forms. Participant observation was also employed to confirm the findings. Engineering distance learning students were purposively and conveniently selected for the study. A conceptual framework was adopted from Aparicio et al.'s e-learning theory. Data were analysed thematically based on emerging themes. Findings showed that some students failed to attend online classes due to a shortage of smartphones/laptops, data, lack of communication from tutors and poor connectivity. Results revealed that students endorsed online learning for augmenting face-to-face contact sessions and flexibility to engage anytime. The study results indicated the existence of challenges, with notable progress. Addressing the challenges and acquiring a data-free learning management system could enhance online teaching and learning.

Keywords: challenges; online learning technologies; pilot study; resources; South Africa; students; TVET

1. Introduction

Technical and Vocational Education and Training (TVET) prepares students for various skilled professions. The integration of online learning in the TVET sector

has become increasingly prevalent in the educational landscape as technological advancements continue in the 21st era (Mhlanga et al., 2022). The COVID-19 pandemic significantly impacted education worldwide, including the TVET programmes. UNESCO (2020a) acknowledges the cessation of on-campus operations due to the absence of online learning contingency measures, which disrupted their academic schedules. Face-to-face programmes, continuous assessments, and examinations were cancelled. The TVET institutions, among other learning institutions, were closed to prevent the spread of the virus, forcing many students to transition from traditional face-to-face learning to online learning platforms (Chinengundu, 2021). Transitioning from traditional face-to-face instruction to online learning has significantly impacted TVET students' experiences, presenting opportunities and challenges (Mesuwini & Mokoena, 2024). In this regard, Suson (2024) indicated challenges in applying online learning, leading to a significant decrease in student satisfaction and a decline in motivation to learn. Table 1 below shows the advantages and disadvantages of online and offline learning from various sources.

Table 1: Advantages and disadvantages of online and offline learning

Aspect	Online learning	Offline learning	Sources
Flexibility	Learn at your own pace and schedule. Provides independent learning	Fixed class times and locations. Learning occurs as a group.	La Fleur and Dlamini (2022); Suson (2024) Sharma et al. (2022)
Convenience	No commuting; learn from anywhere with the internet.	Requires physical presence in the classroom. Structured and distraction-free environment.	Guo and Asmawi (2023); Mesuwini and Mokoena (2024)
Course selection	Access to a wider range of courses globally.	Limited by geographical location.	Demir and Yurdugül (2015)
Interaction	Primarily text-based or virtual.	Face-to-face interaction with lecturers and peer students.	Maulida et al. (2022)
Self-discipline	Requires high self-discipline to avoid distractions.	A structured environment helps maintain focus.	Matiso (2023)
Technical requirements	Requires reliable internet and devices.	No specific technical requirements.	Wei et al. (2024)
Cost	More affordable with no commuting or accommodation costs.	Higher costs due to commuting and accommodation.	Jutz et al. (2024)
Accessibility	Accessible from any location; recorded	Limited to physical presence; fewer	Mesuwini and Mokoena (2024)

	lectures available anytime for review.	review opportunities.	
Learning tools	Utilises various digital tools like videos, PDFs, and podcasts.	Traditional textbooks and physical materials used.	Kolb (2014); Li et al. (2021)
Reliability	Dependent on technology and internet stability.	More reliable as it does not depend on technology.	Wei et al. (2024); Sharma et al. (2022)

Online learning is crucial in South Africa because it can bridge educational gaps and provide access to quality education for TVET students in remote and underserved areas. Researcher experience has shown that many students fail to register due to limited spaces. Therefore, online learning has the flexibility to accommodate many students without infrastructure limitations. The COVID-19 pandemic showed the importance of flexible learning solutions, as many institutions had to quickly adapt to online platforms to continue teaching and learning. This shift has shown that online learning can offer personalised and cost-effective education, which is essential in addressing the country's educational and skills needs (Mesuwini et al., 2024). However, the implementation of online learning in TVET colleges has been limited. According to Zwezwe (2022), approximately 38% of the South African TVET colleges had access to online learning facilities as of 2021. This indicates a significant need for further investment and infrastructure development to fully realise the benefits of online learning in South Africa.

Online learning offers many benefits, which include accessibility, flexibility, and the ability to reach a wider audience. It allows TVET students to access course materials, instructional videos, and interactive content from anywhere, as long as they had internet connectivity, enabling them to balance their studies with work and personal commitments (Mishra & Panda, 2020). Additionally, online platforms can facilitate better engagement with industry experts and peers, encouraging collaboration and networking (United Nations, 2020). Online learning was observed to give more teaching and revision time, allowing syllabi to complete and master the content. Through the recordings, students could play them continually, reinforcing understanding.

However, this shift to online learning also introduces various challenges for TVET students. Technical issues, such as internet bandwidth throttling to no internet connectivity, hardware limitations, and lack of smartphones/tablets and laptops, may impede their ability to participate fully in online classes (Chawinga, 2017; Madimabe & Omodan, 2021). In contrast, slightly over 90% of Polish households have an internet connection at home. It reveals the access to the internet and the likelihood of engagement in online learning. Moreover, TVET programmes often require hands-on training and practical skills development, which could be challenging to replicate in a virtual environment (Omar et al., 2022). Lack of direct supervision and face-to-face interactions with lecturers may also impact the

learning experience and raise concerns about academic integrity (Mishra & Panda, 2020).

The transition to online learning has provided TVET students with the flexibility to balance their studies with work and personal commitments, allowing them to access course materials and participate in virtual classrooms from any location with internet network (Mishra & Panda, 2020). Using scaffolding, students can be guided through the learning resources, guiding the usage of learning technology and how to navigate the online environment effectively. Online learning platforms enable better collaboration and networking opportunities, fostering a sense of community among TVET students and lecturers (Cedefop, 2021). Integrating multimedia elements, such as videos and interactive content, has been proven effective in enhancing the learning experience (Chawinga, 2017). While many students have smartphones, they do not use them for online learning due to connectivity issues. Zero-rating learning management systems could enhance students' online learning engagement.

Understanding the experiences of TVET students in the context of online learning is crucial for programme managers, educational institutions and policymakers to enhance the effectiveness of these programmes (Azeem et al., 2022; Vimbelo & Bayaga, 2023). By exploring the opportunities and challenges that TVET students face, lecturers could design targeted interventions and support mechanisms to optimise the online learning environment. Chara et al. (2023) emphasised the need for online learning technological and emotional support for students and lecturers to ensure impactful sessions.

1.1 Online Learning Concepts

The Learning Management System (LMS) evolved from early computer-based learning tools, with significant milestones starting in the 1960s with PLATO at the University of Illinois (Coates et al., 2005; Singh & Thurman, 2019). In 1995, Web CT was developed by Murray Goldberg as the first LMS, which subsequently became Blackboard, founded by Michael Chasen and Matthew Pittinsky in 1997 (Alshammari, 2020; Singh & Thurman, 2019). An LMS is a web-based application which uses the internet and web technologies to support online learning, enrolment and management of students, administration of educational activities, and reporting the performance of students (Alshammari, 2020). It serves as a comprehensive platform for delivering and managing educational programmes. In the South African TVET context, adopting and utilising LMS has been critical for modernising education and enhancing accessibility. Initially, online learning involved using the LMS primarily for uploading files and managing course content (Singh & Thurman, 2019). Over time, this evolved into a more interactive and integrated approach to education. Martin Dougiamas launched Moodle in 2002, as an open-source LMS (Coates et al., 2005; Ellis, 2009). These systems revolutionised education by integrating course management, content delivery, and student data management into a single platform.

Scholars have used various terms to describe online learning, including blended learning, distance learning, e-learning, online courses, online education, and web-

based learning (Bernard et al., 2014; Jolliffe et al., 2012; Moore et al., 2011). Common themes among these terms include the use of technology, the internet, interactivity, physical distance, and the educational context. Technology is crucial in defining these terms, serving as an effective medium for delivering education.

In the South African TVET sector, integrating electronic communication methods has facilitated lecturer-student interactions during online learning. While some studies use e-learning and online learning interchangeably, others distinguish between them based on the specific technologies used. E-learning is often defined as education delivered via the internet and other electronic mediums, whereas online learning specifically refers to education conducted solely through the internet and web-based platforms (Lee, 2017; Ryan et al., 2016). Understanding these distinctions is vital for effectively implementing and utilising LMS in South African TVET colleges, where the goal is to enhance educational delivery, foster interactivity, and bridge physical distances in the learning process.

1.2 Importance of the Study

This research aimed to explore and understand the perceptions of South African TVET students regarding their online learning experiences and challenges. The study is crucial as it aims to identify barriers to effective online education in the TVET context, where practical, hands-on learning is important. By addressing these challenges, the research sought to contribute to improving online learning strategies, ensuring accessibility, and enhancing educational outcomes for South African TVET students, especially with the rise of increased reliance on digital learning (Adams et al., 2021; Noyoo et al., 2024).

2. Literature Review

Technology is fast-changing. Its effectiveness can be realised when users are familiar with technology and its related systems. Therefore, the TVET sector should brace for the change to deliver quality education according to the sustainable development goal 4 on quality education. Literature is replete with previous research undertaken to demystify using online learning as a pedagogical tool. While online learning seems new in some African countries, its origins are traced back to the 1990s in the United States of America (Antonopoulou et al., 2022).

Mow et al. (2020) investigated the students' attitudes to learning through the Moodle platform and teachers' experience of planning and teaching in a blended learning environment in Samoa. The study explored implementing technology-enabled learning in an environment marred by poor technology. The findings revealed that most students showed positive feedback about interactions and achieving their learning goals. The findings are consistent with another research, which found that tutors could track students' progress through online communication and provide immediate feedback and support (Gunga & Ricketts, 2007). Students highly regarded the structure and organisation of the courses, their content, presentation, online activities, assignments and quizzes. Results indicated a lack of internet access as the main barrier to implementing blended learning. Students also lacked devices to access the LMS, sufficient internet

connectivity and bandwidth, which were pertinent to effectively implementing online learning. A recommendation pointed to the resolution of infrastructure issues.

Bączek et al. (2021) investigated the perceptions of medical students' online learning during the COVID-19 pandemic in Poland. The study showed that most students indicated the ability to stay at home, learning at their own pace and continuous access to online material as advantages of online learning. In support, another Polish study showed that most (99.5%) households with children had a broadband internet connection (UNESCO, 2020b). Findings indicated easy access to learning material and the ability to choose study place and time as advantages. Online learning enables quick delivery and updating of learning material to students (Zehry et al., 2011). However, a lack of interaction with patience, poor interaction between students and lecturers and technical problems with online learning resources were the main disadvantages. Online learning was also regarded as less effective than face-to-face learning in increasing practical skills.

In Saudi Arabia, Alshammari (2020) examined the influence of technical support and instructional design on students' use of the LMS. The study showed that the use of LMS in developing countries was still lagging due to some barriers compared to developed countries. The results showed that technical support significantly influenced students' use of the LMS. The findings revealed that technical support positively influenced students' perceived easiness of using LMS. Furthermore, the findings revealed that technical support significantly determined LMS usage. In the United Arab Emirates, Maraqa et al. (2022) investigated the students' perceptions and experiences of online learning during COVID-19. Online examinations were reported as challenging for students to prepare and difficult to monitor and administer. The findings showed the need for technical support to successfully stream online courses. The continuation of learning during COVID-19 and the availability of recorded materials were perceived as online learning advantages. The study cited the lack of social interaction as the main disadvantage. In a similar study, Milheim et al. (2021) indicated some limitations of the technology, connectivity and lack of experience in using the devices.

Chawinga (2017) researched how social media (blogs and Twitter) facilitates teaching and learning at a Malawian university. Data were gathered in two ways: through analysing students' blog and Twitter posts and a questionnaire to 64 Library and Information Science students to find their perception towards using blogs and Twitter in a classroom environment. The findings suggested that Twitter and blogs could catalyse the much-promoted learner-centred approach to teaching because, using these technologies, students shared and discussed course materials, posted course reflections, and interacted amongst themselves and with their lecturer around the clock. Some reported challenges were the high expense of internet data bundles, inaccessible Wi-Fi, low bandwidths, and a lack of computers.

Ogbonnaya et al. (2020) explored the online learning experiences of pre-service teachers in Ghana. The study focused on the preparedness for online learning, experiences, and challenges for pre-service teachers. Findings suggested that pre-service teachers were digitally literate and mostly accessed online learning using smartphones. Online learning helped them to communicate and collaborate actively with other students and lecturers. It was revealed that online learning offered flexibility and increased the students' motivation to learn. Challenges included poor internet connectivity, high data cost, erratic power supply, lack of appropriate devices, and inability to effectively manage their time. The power supply challenge is similar to South Africa, where load shedding/reduction often disrupted internet connectivity.

From a South African perspective, Mpungose (2020) investigated students' experiences with the change from face-to-face to e-learning owing to the COVID-19 pandemic. Data were gathered using e-reflective activity, Zoom group meetings and a WhatsApp one-on-one semi-structured interview with twenty-six university students. Findings reflected the digital divide as a limitation to students realising the full potential of e-learning. Against this backdrop, lecturers reportedly asked students to submit their assessments and engage in course activities on the Moodle LMS. A similar study by Mukuna and Aloka (2020) revealed various challenges to online learning, including poor network access and a lack of learning devices. Disadvantaged students were hindered from realising the full potential of e-learning due to various digital divide challenges. A need for increased investment in upgrading resources, both in universities and at a community level, was recommended to bridge the digital divide gap. A gap in TVET exists since the study covers university online learning.

Another South African study on educator perceptions and the use of technology in schools showed results from diverse educational settings (Torres & Giddie, 2020). Fee-charging schools had more resources and better infrastructure compared to no-fee-paying schools. Educators in rural areas had limited resources and lacked training in computer skills to use technological tools and applications such as MS Word, Excel, PowerPoint and email (Torres & Giddie, 2020). Mukuna and Aloka (2020) reaffirmed the importance of providing adequate resources such as internet connectivity, and Information and Communication Technologies learning devices to ensure effective online teaching and learning. Moreover, Morel and Spector (2022) found a need for ongoing professional development in technology integration. In this regard, Makgato (2014) proposed that teacher education training programmes include modules on the pedagogy of teaching and learning technology to equip educators with the expertise required to deliver such courses. Again, the study covered affluent schools in South Africa, where resources are available. There is a gap in TVET online learning where the implementation is limited and marred by a shortage of resources.

Face-to-face learning became vulnerable to the COVID-19 pandemic, resulting in a shutdown of campuses. United Nations (2020) reported that almost 2 billion students worldwide were disrupted due to the closure of all learning institutions. Alternatives were sought to allow students to realise their goals. This study

explored the experiences of TVET students in the online learning space. A qualitative and comprehensive online open-ended Google form sought to gain valuable insights into the perceptions, preferences, challenges, opportunities and suggestions of TVET students in adapting to online learning. The findings contribute to the existing online learning body of knowledge and help formulate evidence-based approaches to enhance the accessibility and quality of TVET online education. The current study aims to contribute to the paucity of online learning research in the South African TVET sector.

3. Methodology

A qualitative case study approach was employed to explore the experiences and perceptions of engineering distance learning students regarding online learning. This approach was chosen to gain an in-depth understanding of the experiences and perspectives of the participants in the context of online engineering education. The research tool included participant perceptions, attitudes, challenges and experiences of online learning in a TVET context.

3.1 Research Instrument

Data were gathered using an online open-ended Google Form. The instrument was designed to capture participants' experiences, attitudes, and challenges related to online learning in TVET engineering studies. The instrument link was sent to the participants through a blind copy email and sms to ensure they received it. A total of 25 engineering students participated in the study. The instrument was piloted with some colleagues to eliminate grammatical errors and ambiguity in the wording. Using an online survey allowed for efficiently collecting responses from a geographically dispersed participant pool. Participants were asked to consent to additional follow-up questioning as a way of probing, member checking and confirming the findings. We have done this by inviting participants to provide a contact email. In addition to the survey, participant observation was employed as a complementary data collection method. This approach involved the researcher actively engaging with the participants in the online learning environment. By observing the online interactions, discussions, and activities, the research intended to obtain a deeper understanding of students' experiences and verify the findings obtained from the survey. Participant observation allowed for the collection of rich, contextual data that could enhance the credibility and depth of the study.

3.2 Research Sampling Techniques

Participants were purposively and conveniently selected to ensure they represented various engineering distance-learning students. A TVET college was conveniently selected in KwaZulu-Natal province, South Africa, due to its proximity to the researcher. All the engineering distance learning students (N1-N6) formed the study population. The purposive sampling aimed to include students with varying levels of online learning experience, academic backgrounds, and demographic characteristics. Purposive sampling seeks information-rich cases that can be studied in-depth about important issues central to the research purpose. Convenience sampling was also employed to make the data-gathering process more feasible, given the online nature of the study. The

sampling technique offered accessibility and proximity of participants. Mesuwini and Mokoena (2024) agree that convenience sampling refers to situations where population elements are selected because they are easily and conveniently available. Participants from different engineering distance learning programmes were recruited to ensure a comprehensive perspective.

3.3 Data Analysis

The gathered data from the open-ended online survey and participant observation were subjected to the six steps of thematic analysis by Clarke et al. (2015). The steps included familiarising with the data, generating codes, generating themes, reviewing themes, defining and naming themes, and interpreting and reporting data. The process involved systematically identifying and exploring recurring themes, patterns, and insights within the dataset. The analysis process allowed for the identification of commonalities and differences in the experiences of engineering distance learning students and provided a structured approach to understanding the qualitative data.

3.4 Triangulation

To enhance research rigour, triangulation was employed by using multiple data sources. The combination of survey responses and participant observations allowed for the cross-verification of results and the validation of emerging themes. Triangulation ensured that findings presented a comprehensive and robust representation of the participants' experiences. Findings were corroborated, and the strength of other data compensated for weaknesses.

3.5 Ethical Consideration

Ethical authorisation was obtained from the research ethics committee prior to data collection. Participants were provided with informed consent forms outlining the purpose of the study, their rights, and the confidentiality of their responses. Participants were pseudonymed Student 1-25 to hide their identities since they were assured that their identities would be kept confidential and data would be used solely for research purposes. Some scholars posit that pseudonyms prevent traceability, thereby protecting the privacy and anonymity of participants (Braun et al., 2021; Roberts, 2015).

6. Theoretical Framework

The e-learning systems' theoretical framework has three main components of information systems: people, technologies, and services. People (tutors, students, LMS technology providers, and support teams) use e-learning platforms to facilitate teaching and learning. Stakeholders' groups and their interactions are defined with e-learning systems based on these fundamental pillars. Connectivism was the e-learning theory because it accepts technology as a major factor in the learning process.

E-learning technologies (laptops/tablets/smartphones/computers/document scanners, LMS) enable the direct and indirect interaction of the different user groups (Aparicio et al., 2016). Technologies provide support to enable communication, provide collaboration tools and integrate content. A classification

of the technological considerations is presented with a focus on the type of content and communication. E-learning incorporates all activities associated with pedagogical concepts and instructional methodologies. The complex interaction combination emanates from the direct or indirect engagement with e-learning systems. E-learning activities matched with e-learning pedagogical models and instructional methodologies are called service specifications. The connectivism theory shown in figure 1 below was used to predict, explain and understand the phenomena under study. The theory also points at areas that have not been explored, showing the gaps in the area under study.

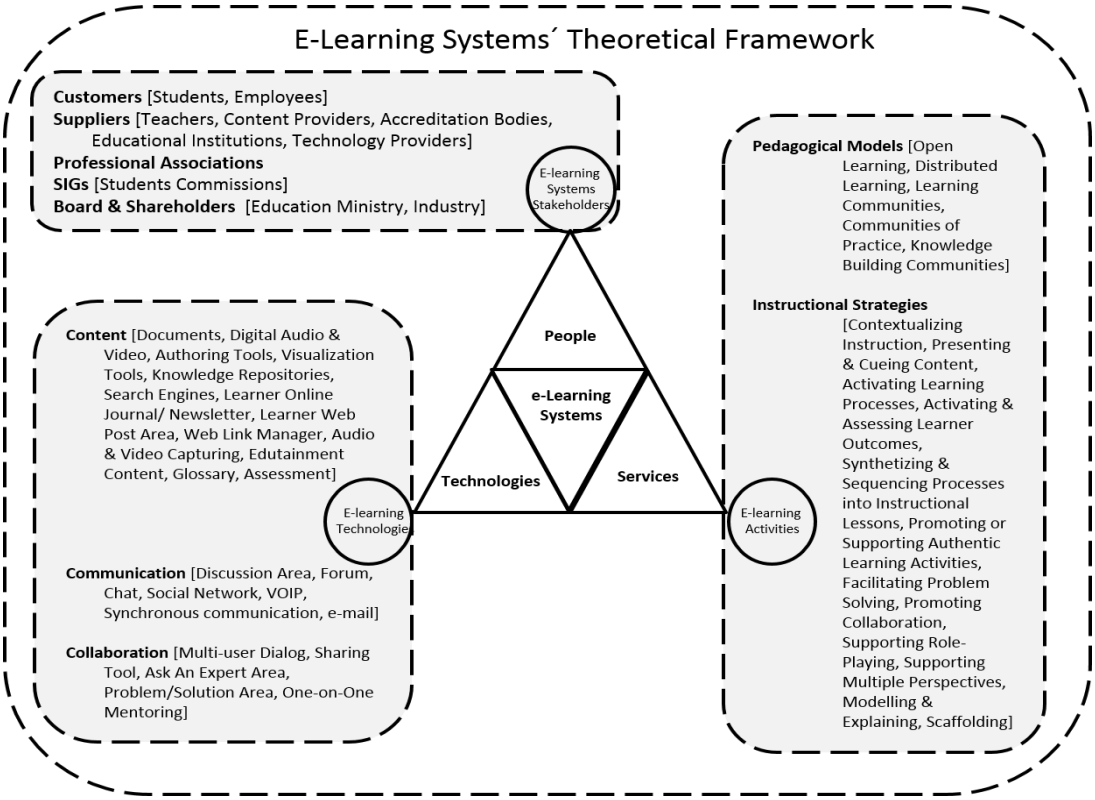

Figure 1: E-learning systems theoretical framework (Aparicio et al., 2016, p. 302)

7. Results and Discussion

The results showcased real-life anecdotes and affirmations from TVET students, providing a holistic view of their journey through online learning. Examining students' online learning experiences provides valuable insights and equips them with the necessary skills for their chosen careers. The discussion focused on themes illuminated by the findings around communication, technology limitations, accessibility and flexibility, effective teaching methods and students' perceptions. Scholars indicate that qualitative survey data can be analysed thematically, and the data can be organised from across the entire data set, with illustrations of vivid and compelling excerpts from participants (Braun et al., 2021; Roberts, 2015).

7.1 Communication

Communication is key to every endeavour, without which innovations are bound to fail. Participants showed that some tutors communicated but expressed that they could have done it better. Student 1 said:

> "*It is better if the Tutor gives us a link on WhatsApp, not via email. It is so important to have those classes, especially for me.*"

> "*Yes, the Tutor opened a WhatsApp group to reach her when we have questions. We also used Microsoft Teams.*" (Student 3)

The student emphasised WhatsApp as a more effective and convenient platform. This preference likely stems from the immediacy of WhatsApp notifications, making it easier to keep up-to-date with class information. Additionally, the student's emphasis on the significance of the classes indicated a strong desire to actively participate in the online learning process. This aligns with the broader trend of using instant messaging platforms (WhatsApp) to facilitate quick and direct communication between Tutors and students. The finding aligns with observations that some tutors created WhatsApp groups, which they used to communicate with their students.

> "*Yeah, we have got WhatsApp group and Microsoft (online classes). She also sends voice notes to clarify where we are left.*" (Student 6)

Contrary to the above excerpts, Student 2 reported that the "*Tutor was never reachable via WhatsApp, but all I can say is the guy was bad when communicating via WhatsApp. We were on our own most of the time*". Through observation, some tutors did not attend the sessions or communicate with students. Student 8 acknowledged communicating with their Tutor through "*WhatsApp, email, voice call and Microsoft Teams*". The researcher observed the usage of WhatsApp as a way of conveying quick messages when online sessions were starting, changed or postponed. It served as an alarm which kept students alert. Sentiments showed that some tutors communicated with their students while others did not. These results agree with Faturoti (2022), who posited that the delivery of lectures moved online through platforms such as Zoom, Google Hangouts, and Microsoft Teams. Microsoft Teams platform is known for its integration with virtual classrooms, document sharing, and real-time collaboration features. Its inclusion in the students' learning experience suggests a multi-faceted approach to communication and interaction. This approach recognises that different platforms serve varying purposes, and a combination of tools can enhance overall engagement and information dissemination.

Failure to communicate with students could negatively affect online learning since students depended on Tutor guidance. Creating a WhatsApp group reflects the Tutor's recognition of the students' need for prompt assistance and clarifications. WhatsApp gave students a direct channel to contact the Tutor, potentially leading to quicker responses and enhanced engagement. The researcher observed that the WhatsApp internet data bundle was more affordable so that communication could reach a wider audience. This approach highlights the importance of students' preferred communication platforms to foster a supportive online learning environment.

These excerpts demonstrated the significance of communication platforms that resonate with students' preferences and align with their online learning needs. Integrating WhatsApp and Microsoft Teams into the online learning process reflected a student-centred approach that promotes accessibility, engagement, and efficient communication between tutors and students.

7.2 Technology Limitations

Online learning is faced with various technology limitations. The section below describes the issues regarding technology limitations illuminated in this study. These limitations include inadequate resources, appropriate computer skills and internet connectivity. The following section discusses online learning challenges.

While online learning offers numerous benefits, it has unique challenges that students, lecturers, and TVET institutions must consider carefully. These challenges span across various aspects of the online learning experience, influencing the effectiveness of education and the overall learning journey. Student 1 said:

> *"The structure of the lessons is not as put well together as they should have with the PowerPoint presentation and so on. Some tutors did not use PowerPoint during their online lesson delivery."*
>
> *"It can be more effective if the tutors can write so that the little hidden details presented can be seen other than using prepared slides."* (Student 2)

The student pointed out that there is room for improvement in how lessons are organised and presented. The mention of "*PowerPoint presentation and so on*" suggested that students expected a coherent and logical content progression through visual aids like slides. However, not all tutors consistently utilised PowerPoint as a tool for their online lesson delivery. These excerpts highlighted the significance of well-structured lessons in online learning, showing that clear organisation helps students follow the learning path and comprehend complex concepts. The importance of providing detailed explanations and annotations during online lessons was expressed by Student 2, who preferred tutors to write in real-time rather than relying merely on prepared slides. Writing in real-time, especially on a digital whiteboard or within the online learning platform, allows for immediate responses to student questions, customisation of explanations, and emphasising key points as needed. It also encourages a more interactive and adaptable learning experience, promoting active engagement and addressing individual learning needs.

The finding resonates with the observation that some tutors conducted online lessons without sharing slides or any document on screen. It sheds light on a common challenge students face when tutors do not utilise digital tools for content delivery. The presentation of materials in online learning is crucial for student engagement and comprehension. Without visual aids like slides, documents, or multimedia presentations, students may struggle to grasp complex concepts or follow the flow of the lesson. Tutors who failed to incorporate visual

elements or shared relevant documents might unintentionally hinder the learning experience, leaving students feeling disconnected or disadvantaged. The findings are consistent with Mesuwini and Mokoena (2024), whose study on online teaching and learning in South African TVET colleges found that internet access, lack of training on online pedagogies, unavailability of gadgets, and poor policy framework hampered online learning. Nsengimana et al. (2022) supported that online learning was inhibited by a lack of material, equipment, internet connectivity and sufficient knowledge for lecturers and students to use the new technologies. TVET institutions should prioritise the development of online teaching skills, training and support in online pedagogy to assist tutors maximise the utilisation of digital tools, ensuring that online lessons are engaging, informative, and accessible to all students (Madimabe & Omodan, 2021).

This preference likely arises from the desire to capture "*hidden details*", nuances, and subtle explanations that might not be evident through prepared presentations. The inconsistent use of PowerPoint presentations might lead to discrepancies in learning experiences, with some students benefiting from visual aids while others may not. This raises the need for training and support for tutors to effectively design and use instructional materials to enhance consistent lesson delivery and engagement.

Regarding resources, Student 4 lamented that:

> "*The college should provide laptops or smartphones to students and a monthly data allowance so that students can attend online classes.*"
>
> "*Yes, if the tutors can record the lesson videos so that we can access them when we log in later as we experience load shedding at different times. My area has no network when load shedding.*" (Student 9)
>
> "*A lack of resources (laptop) limits me from enjoying the classes. Some lecturers could not engage because they did not have laptops. Equally, some students did not have gadgets to use.*" (Student 10)

Students reflected a critical concern about the accessibility of online learning. They suggested that the college should proactively bridge the digital divide gap by providing essential resources such as laptops, smartphones, and data allowances. The results agree with Madimabe and Omodan (2021), whose findings suggested that free zero-rated internet presented access for tutors and students. The findings match those observed in previous studies (Madimabe & Omodan, 2021) that resources enable tutors to effectively plan lessons and prepare teaching aids and other resources that assist in delivering good lessons. This assertion acknowledges that not all students have access to the necessary devices or stable internet connections required for seamless participation in online learning classes. The findings are consistent with Bączek et al. (2021), who indicated limitations such as poor internet connection and challenges with internet access. Providing laptops, smartphones, and data aligns with ensuring equitable access to education. By doing so, the college can help level the playing field and create a more inclusive learning environment. The provision of resources recognises the socioeconomic inequalities that affect students' ability to

engage effectively in online learning. Load shedding in South Africa refers to scheduled power outages. Student 9 suggested recording lesson videos to access them later when they face logging-in issues due to load shedding or lack of network connectivity. The excerpts by Students 9 and 10 were consistent with observations that some tutors could not engage in online classes because they did not have a laptop, data or both. Likewise, some students reported failing to attend online classes due to a shortage of data and smartphones, while others had technical glitches installing the application. A shortage of these resources negatively impacted teaching and learning.

Lesson recording is a practical solution to accommodate students impacted by external factors beyond their control. It allows students to catch up on missed content and ensures continuous learning despite logistical challenges. This approach also caters for different learning paces and individual circumstances, fostering a more flexible online learning environment. Student 12's suggestion acknowledges the financial constraints some students faced regarding data expenses and points to maintaining a blended learning approach so that students could attend these sessions without undue financial burden on data purchase.
The importance of effective lesson structuring and the choice of instructional tools in online learning environments as it significantly enhances student engagement, facilitates better understanding of the material, and caters to diverse learning styles, leading to improved educational outcomes. The insights provided by the students emphasised the significance of clear organisation, dynamic interaction, and adaptability in facilitating comprehensive understanding and engagement during online lessons. Suggestions for providing essential devices and data allowances, recording lessons, and maintaining consistent contact sessions demonstrated the need for flexibility, accessibility, and responsiveness in designing effective online education strategies.

7.3 Accessibility and Flexibility

Online learning offers the flexibility to learn without geographical barriers. Student 12 acknowledged that "*It helps us who stay away from the college since the institution enrols distance learners from across the province and beyond*". In agreement with online learning, Lecturer 15 affirmed:

> "*Yes, it would be good as I have to travel a long distance for contact sessions. Working students and those staying far away applauded the online learning initiative.*"
>
> "*Not all of us can access contact sessions, so online classes can help us with long-distance learning.*" (Student 18)

Online learning provided opportunities for students to access education without geographical constraints. This aligned with reaching a wider audience through digital platforms, accommodating students from various areas and reducing travel time and costs. The finding aligns with Bączek et al. (2021), who identified online learning benefits such as time and place flexibility and ease of access to educational material. Students 12 and 15 explained the removal of barriers to online learning, which aligned with the needs of employed students and those residing far from the college who applauded the flexibility of online learning, as

it allowed them to balance their work commitments and educational pursuits. The findings align with Milheim et al. (2021), who showed that online learning maintains access to their academic work and materials while travelling and working. Factors such as distance, transport limitations, and other personal circumstances could hinder students' ability to participate in physical contact sessions. Online learning offered a solution by ensuring accessible education to a broader range of students, regardless of their physical location. Many students were observed coming from surrounding provinces since the college offered courses that most public TVET colleges did not offer.

Student 16 commented on the online session, saying:

> *"It is very important that we sometimes study online because sometimes we miss contact sessions because of different reasons."*

> *"I think the face-to-face contact sessions should continue between the online sessions. The timetable should not change to help students struggling with data."* (Student 13)

> *"It helped record the online lessons so those who could not attend could watch during their spare time and for those who would like to repeat."* (Student 14)

By preserving the regular contact sessions, students could benefit from face-to-face interactions when data constraints arose while still having the flexibility of online learning. A study by Bączek et al. (2021) confirmed that poor interaction between tutors and students could hamper online learning. Recording online lessons catered for students who failed to attend a session in real-time, enabling them to catch up at their convenience. Additionally, recording lessons benefited students who wish to review content for better understanding and retention. All the online sessions were set to record automatically upon logging into the platform. Hence, all lessons were recorded for future reference. However, the challenge was that MS Teams kept the records temporarily before they were deleted. During online monitoring, students were observed to log on and access recordings and other uploaded files. Findings reflected a positive impact of online learning on a diverse student population. The online learning approach accommodated distance learning students, helping those with connectivity challenges. It emerges as a flexible and inclusive approach that addresses various educational needs and circumstances faced by diverse students.

7.4 Effective Teaching Methods

The following excerpts shed light on effective online learning methods. The section discusses how these excerpts reflect different aspects of effective online teaching and learning. Student 17 compared different platforms and said:

> *"Yes, but via WhatsApp conference call is easier than Microsoft Teams. Comparatively, WhatsApp is simpler to use than MS Teams. Some students and tutors had challenges downloading the MS Teams App."*

The participant highlighted the importance of user-friendly tools for effective online learning. The preference for WhatsApp conference calls over Microsoft

Teams was based on the ease of use and accessibility of the platform. Effective teaching methods consider the technical proficiency of both students and tutors, ensuring that the chosen tools were easily navigable and promoting active engagement.

> *"The Tutor was so amazing. What we did not cover in class was taught online, and it was so effective as he was active."* (Student 20)

The tutor's initiative to conduct additional online sessions reflected proactive teaching, fostering a deeper understanding of the subject matter.

> *"Online classes are helpful because you can ask the Tutor more questions and better understand the module."* (Student 5)

> *"Online learning was helpful because the Tutor got an easy or simplest way of attacking questions."* (Student 18)

Student 5 emphasised the value of interactive learning and accessibility to tutors. Effective teaching methods encourage active student participation and foster open communication. Online platforms can provide a comfortable environment for students to ask questions, leading to a deeper understanding of the subject matter. The tutor's ability to simplify complex concepts demonstrated effective instructional strategies. Simplified explanations enhanced students' comprehension and highlighted the importance of pedagogical skills in online teaching. Some tutors explained their slides step by step to the satisfaction of students. Other students posited:

> *"It was ineffective because my course has a drawing subject, so I do not know how to draw. I need a tutor to assist me."* (Student 22)

> *"For Tutors to be fully trained or be provided with a writing board for sketches, it will be very helpful."* (Student 21)

> *"I think tutors need to familiarise themselves well with online learning."* (Student 17)

While providing personalised guidance and support for students struggling with specific aspects of the course was essential for fostering effective online learning, such endeavours were not rewarding without the necessary teaching and learning technologies. The results support the study of Alshammari (2020), who showed that technical support significantly influenced students' easiness of using LMS. Effective teaching recognises the unique challenges that certain subjects present and tailors instructional methods accordingly. Practical subjects like drawing require specific tools and instruments, without which face-to-face or online learning remains a dream. In subjects involving sketching or visual components, having tutors who are well-versed in the subject matter and proficient in using tools like writing boards can enhance the online learning experience. Training ensures that tutors can deliver content effectively and engage students meaningfully.

Most drawing tutors were observed to have challenges conducting their lessons because they did not have the appropriate resources to teach drawing effectively.

> *"Having the Tutor go through the syllabus with us online and in contact lessons made it easier for us to finish it. Had the online sessions started early, enough could have allowed covering all syllabus content."* (Student 19)

Student 19 further explained the benefit of online learning, saying, "A*s a very shy person, during online classes, I asked everything that I did not understand."* Again, Student 16 echoed the same sentiments that online learning *"is very useful because sometimes I have a fear of asking many questions at one time"*. Online learning provided students with the opportunities to ask questions and seeking clarification. In traditional classroom settings, shyness might deter individuals from speaking up, but the digital format increases participation and engagement. This example showcased how technology can level the playing field and create a supportive space for all students, regardless of their personality traits. The results are also consistent with a study by Faturoti (2022), which revealed that teaching requires the tutor's input to select and arrange information in ways that guarantee continuity in learning.

Effective teaching involved a combination of online engagement and in-person interaction to cover the syllabus comprehensively. Furthermore, online session punctuality ensures ample time to address course content, answer questions, and facilitate meaningful class discussions. The above excerpt highlighted the benefit of a blended learning approach where online learning augments face-to-face contact. User-friendly tools, proactive tutoring, accessibility to resources, interactive engagement, and simplified explanations contributed to the effectiveness of online teaching and promoted meaningful learning experiences. Personalised assistance, subject-specific training for tutors, and a balanced approach to online and contact sessions contribute to effective teaching and optimum learning outcomes. Recognising the unique needs of different subjects and students is crucial to effective online teaching and learning pedagogy. The perceptions of students towards online learning were also recorded.

7.5 Students Perceptions

Concerns were raised about online lesson presentations. Student 24 said:

> *"If it can be improved, more in a video form rather than an audio, like how YouTube works. I would definitely do, but if it is an audio, no thanks."*

The comparison to YouTube further emphasised the popularity of visual content platforms and their impact on engagement and understanding. The excerpt revealed students' diverse perceptions and preferences regarding the format, structure, and effectiveness of online learning. Visual content, effective lesson structuring, equitable access, and considerations of learning styles all played crucial roles in enhancing students' online learning experience, making learning more interactive and impactful. The finding corroborates the ideas of Letseka et al. (2018), who suggest that using video technology for class discussions and tutorials bridges time, educational, communication, economic, and geographical distances between students and tutors.

In a similar vein, Student 25 added:

> *"Not anymore because the structure of the lessons is not well organised as they should have PowerPoint presentations and so on. Some tutors did not use PowerPoint during their online lesson delivery."*

Students expected well-organised lessons with clear presentations, possibly through tools like PowerPoint. Inconsistent use of such tools could lead to variations in learning experiences. Effective online teaching involved creating structured content and employing multimedia resources to support learning objectives. Contrarily, Student 18 opted out of online learning:

> *"Stop online learning because some students do not have phones, and we do not have enough data. We have network issues due to load shedding."*

Student 16 denied online classes, saying, *"I do not find it easy to study online. I prefer walk-ins."* Not all students had the necessary devices, data, or stable network connections for successful online learning. These practical barriers emphasised the need for equitable solutions considering students' diverse circumstances and ensuring equal access to education. Student 26 highlighted a preference for in-person, physical classes over online learning. This finding agrees with the results of other research by Gunga and Ricketts (2007), in which technophobia was described as invoking negative emotions like fear, nervousness, anxiety, and stress. Technophobia is associated with the fear and avoidance of technology, which affects online performance. Some students found face-to-face interactions more conducive to their learning style, involving immediate responses to questions, real-time discussions, and direct engagement with peers and tutors. It was observed that load shedding, lack of data, and gadgets hindered online learning. Students' sentiments followed the conditions under which online learning was conducted. **Table 2** below summarises a display of the general perceptions echoed by students about their online learning experiences. The participant observation comments support the students' perceptions.

Table 2: Students' perceptions and participant observer feedback

Responses for the state of readiness to engage	Participant observation
No, because of the load shading, we struggle with the network.	Power outages disrupted lessons. In some cases, they could rejoin, while in others, the connection was lost, especially for those staying in peri-urban areas.
No, the lack of resources (laptop) limits me from enjoying the classes.	Some lecturers could not engage because they did not have laptops or data. Internet data and gadgets were not allocated to students.
Yes, and I live far from the institution. I am in Gauteng. It helps us who stays away from the college. Working students and those staying far away applauded the online learning initiative.	The institution enrols distance learners from across the province and beyond.

Yes, it would be good as I have to travel a long distance for contact sessions.	
Yes, but via WhatsApp conference call is easier than Microsoft Teams.	Comparatively, WhatsApp is simpler to use than MS Teams. Some students and tutors had challenges downloading the MS Teams App. WhatsApp was observed to take less data than MS Teams.
Yes, late from 21:00 till late, no problem.	Some sessions were conducted until 21h30.
No, eish internet data is always challenging.	Students without smartphones/data did not welcome the initiative.
Yes, but it has to be scheduled accordingly with load shedding so there are no interferences.	Since students come from different places, the load-shedding schedule was different, making it difficult to have a timetable suitable for everyone.
It was not effective because there were no online classes.	Indeed, some tutors did not engage in online classes, citing resources and unspecified reasons.
I do not have data bundles for online classes.	Some students could not afford data, while others did not have smartphones for online learning.
Yes, I did have a smartphone, but not anymore.	

Table 2 highlights students' online learning experiences and observations done during online learning.

8. Integrating e-Learning Theory

In the context of this study on the experiences of engineering distance learning students in online education, it is pertinent to situate the findings within the framework of e-learning theoretical perspectives. Aparicio et al. (2016) proposed a framework outlining key dimensions and factors contributing to the effectiveness of e-learning environments. The framework provides valuable observations into the challenges and opportunities noted in the study. One of the central components of the Aparicio et al. (2016) framework is the "Technological Dimension", which incorporates the tools and resources used in online learning. Findings resonate with this dimension as observed that some tutors conducted online lessons without sharing slides or any document on screen. This omission aligns with the emphasis by Aparicio et al. on the importance of technological support for effective e-learning. Lecturers who neglect to utilise digital tools may unintentionally hamper the students' learning experiences by blocking the full utilisation of resources.

Aparicio et al. (2016) highlight the "Pedagogical Dimension", which emphasises the need for sound pedagogical strategies in online learning. Findings emphasise the significance of this dimension. Effective content delivery, as evidenced by using slides and documents, is a fundamental pedagogical consideration in online learning. Tutors who integrate visual aids and structured content enhance the clarity of the material, aligning with the pedagogical principles emphasised by Aparicio et al.

Additionally, the "Social Dimension" of e-learning, as outlined by Aparicio et al., stresses the importance of interaction and collaboration among students and tutors. Findings indirectly highlight the need for social engagement in online learning. Tutors who effectively utilise digital platforms for content sharing and facilitate discussions contribute to a more interactive and engaging online learning environment. Aparicio et al. (2016) e-learning theoretical framework provides a valuable lens through which to interpret the findings and contextualise the challenges observed in the experiences of engineering distance learning students. It emphasises the interplay of technological, pedagogical, and social dimensions in effective e-learning environments, which resonates with the multifaceted nature of online learning challenges and opportunities revealed in this study. Incorporating these theoretical perspectives enriches understanding of the complexities surrounding online learning and highlights the importance of comprehensive e-learning strategies that encompass both technological and pedagogical considerations.

Online learning emerged as a flexible and inclusive approach that addresses various educational needs and circumstances faced by various students. Integrating WhatsApp and Microsoft Teams into the online learning process reflected a student-centred approach promoting accessibility, engagement, and efficient communication between tutors and students. Providing devices and data, lesson recording, and maintaining consistent contact sessions demonstrated the need for flexibility, accessibility, and responsiveness in designing effective online education strategies.

9. Limitations of the Study

The study focused on the only TVET college in the district, which offered online learning. A mixed methods approach could have complemented the results and improved the methodological approach.

10. Conclusion and Recommendations

The study addressed several significant implications for tutors and researchers in online learning. The TVET students' online learning experiences present a dynamic landscape of challenges and opportunities. As technology reshapes education, integrating online learning into TVET programmes offers various benefits, including flexibility, accessibility, and enhanced engagement with industry experts. However, some obstacles impede the seamless adoption of online learning among TVET students, particularly with limited access to smartphones, tablets, laptops, and reliable internet connectivity. Load shedding was listed as a key block and keyway to internet connectivity. However, challenges persist in the online learning environment for TVET students, and these challenges are exacerbated by limited resources, hindering their participation in online classes and preventing them from benefiting fully from remote learning. Moreover, unreliable internet connectivity poses a significant hurdle, leading to disruptions in accessing online class course content and engaging in discussions.

While online learning in TVET presents numerous opportunities for enhancing education accessibility and engagement, technology access and practical skill development challenges remain prevalent. By addressing these challenges proactively and leveraging the potential of online learning, stakeholders could work towards creating an effective and inclusive educational environment that equips TVET students with the skills and knowledge required to succeed in their chosen professions. Educational institutions and policymakers must implement targeted interventions to address these challenges and develop an inclusive online learning environment for TVET students. Initiatives to bridge the digital divide and expand access to technology in underserved areas need priority to enhance online learning. This can include providing subsidised or loaned devices and partnering with telecommunication companies to enhance internet connectivity in remote regions. Strategies to foster community and peer support within the online learning platform can help mitigate feelings of isolation and disengagement. Acquiring reputable zero-rated data LMS platforms and securing partnerships with network providers should be prioritised to support effective teaching and learning in TVET colleges. The research adds to the body of knowledge in TVET online learning research and recommends solutions to minimise the digital divide. Further studies could focus on a large-scale study on TVET online learning in South Africa to ascertain how many colleges have adopted learning online and its impact on skills development.

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