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Exploring online teaching and learning challenges for the technical and vocational education and training lecturer

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Abstract

This paper explored the challenges lecturers face in teaching through online platforms. Online learning has become increasingly prevalent in Technical and Vocational Education and Training (TVET) institutions, offering opportunities and challenges for TVET lecturers. The transition from traditional face-to-face teaching to online environments requires lecturers to adapt to the new teaching methods, design engaging content, and navigate digital platforms. The qualitative research gathered data from 35 lecturers out of 60 conveniently and purposefully selected from five engineering campuses at a South African TVET college. Participants were accessible to the researcher and possessed online teaching experiences. Participant observation was used as a data-gathering tool. The study attempts to answer the question: What challenges are lecturers facing during online teaching and learning? The Technological Pedagogical Content Knowledge Framework for Teacher Knowledge by Koehler and Mishra guided the study. Data were analysed thematically from the identified patterns and themes. The findings revealed technical difficulties like connectivity and software glitches, which disrupted the teaching and learning process. Lecturers grappled with receiving practical online support. The limited interaction and collaboration among students in virtual settings posed additional challenges in maintaining engagement and addressing individual learning needs. Furthermore, access and equity issues hindered students' ability to participate fully due to inadequate technology, internet access, and power outages. To overcome these challenges, the study recommended lecturers continuous professional development in online learning methods and technologies. Addressing the challenges contributes to the successful implementation of online learning in the TVET sector by ensuring quality education and enhancing students' skills and competencies.

Keywords: Challenges, Lecturer, Online learning, Technology, Online teaching, TVET.

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Contents

Contribution of this paper to the literature

This paper contributed to the evolving online teaching and learning landscape of Technical and Vocational Education and Training (TVET) by acknowledging its growth in the sector. It emphasised the nature of challenges and opportunities, focusing on the under-researched TVET lecturers' adaptation to new teaching methods and online learning platform navigation.

1. Introduction

Online learning refers to the support of learning processes using internet-based media and a computer, laptop, or smartphone. Department of Higher Education and Training (DHET) (2017) views online learning as a learner-centred method where effective support systems remove educational barriers. Technical and Vocational Education and Training (TVET) lecturers face challenges in transitioning from traditional classroom settings to online platforms. They should learn to navigate and effectively utilise online learning tools and technologies. However, not all TVET lecturers have access to the technology and internet connectivity required to effectively conduct online learning. This can hinder their ability to deliver online lectures and effectively interact with students. Since the TVET courses often involve hands-on practical training, it is difficult to replicate in an online setting. Lecturers face challenges in finding innovative ways to engage students and provide practical learning experiences through virtual means. Lecturers need to modify instructional materials, assessments, and practical assignments to fit the online environment, ensuring alignment with learning outcomes and program requirements. Due to the technology requirements of online assessments and the current (Department of Higher Education and Training (DHET), 2017) assessment policy, the TVET sector is obliged to run controlled assessments where students have to be physically present onsite. This policy renders the online learning initiative useless, as it does not support online assessment in the TVET sector.

Assessing students' practical skills and knowledge acquisition can be more complex in an online learning setup. Online learning environments present challenges in upholding assessment integrity, preventing cheating, and maintaining the validity and reliability of assessments (Anthony et al., 2022). Assessing practical skills and competencies in an online learning environment poses challenges for TVET lecturers. The assessment of practical skills and competencies in an online learning environment can be complex. TVET lecturers encounter challenges in finding suitable methods to evaluate hands-on abilities, provide constructive feedback, and ensure the authenticity and validity of assessments. Research highlights the need for innovative assessment methods, such as remote simulations, video demonstrations, and portfolio assessments, to ensure valid and reliable evaluation (DeCoito & Estaiteyeh, 2022; Joy & Pillai, 2022). Therefore, there is a need to explore alternative assessment methods and tools to ensure an accurate evaluation of students' abilities at this age.

The COVID-19 pandemic outbreak resulted in the closure of TVET colleges and universities across the globe (Baber, 2020; UNESCO, 2020). While the pandemic was a menace to the world, it catalysed the quick transfer to online teaching and learning. The increase in COVID-19 cases led to the World Health Organisation (WHO) declaring travel and social distance restrictions worldwide. The social distance restrictions affected the number of students per class, reducing contact time. COVID-19 increased awareness of online learning because TVET colleges were forced to shift from face-to-face teaching to online learning (Mapulane, 2021). During the pick period of the pandemic, physical contact was abandoned in favour of online teaching (De Giusti, 2020).

Online teaching requires using information and communication technology (ICT) gadgets, network connectivity, and electricity. However, online teaching and learning is observed to be poorly endowed with resources. Some online teaching and learning challenges include limited computer literacy, digital imbalance, and a lack of virtual laboratories that support teaching and learning (Baber, 2020; Karani & Waiganjo, 2022). TVET is meant to train hands-on skills through practical activities in workshops, which enable students to acquire industry-relevant competencies. Bączek, Zagańczyk-Bączek, Szpringer, Jaroszyński, and Wożakowska-Kapłon (2021) concur that online learning was considered less effective in increasing the acquisition of practical skills. Therefore, online learning has minimum interaction, compromising practical skill acquisition (De Giusti, 2020; Karani & Waiganjo, 2022). It translates to a challenge where students are left to convert theoretical concepts into practice.

The online learning concept has existed since the 1990s (Fleming, Becker, & Newton, 2017). According to Whalley and Barbour (2020) online learning is a collective term for all virtualised teaching and learning initiatives. Online learning allows teaching and learning to occur remotely using educational technologies.

While building rapport and effective communication with students can be more challenging in an online environment, lecturers need to find ways to foster student engagement, encourage active participation, and provide timely feedback through digital platforms. TVET lecturers also face the challenge of not having direct, in-person interaction with their students and addressing individual concerns effectively. Without face-to-face interactions, some students may struggle with self-motivation and discipline in an online learning environment (Bismala & Manurung, 2021). Furthermore, TVET programs emphasise teamwork and collaboration among students. In an online learning setup, lecturers may face obstacles in facilitating effective collaboration, communication, and teamwork, potentially hindering students' ability to develop important teamwork and interpersonal skills. Lecturers encounter challenges in promoting student interaction and collaboration in online learning settings. Studies emphasise the importance of fostering virtual communities, implementing effective online communication tools, and providing opportunities for peer-to-peer collaboration (Shattuck, 2013).

Lecturers should employ strategies to keep students engaged, motivated, and accountable for their learning progress. To circumvent these challenges, lecturers may require additional training and support to enhance their online learning pedagogical skills and keep updated with the latest technological advancements. Lecturers require continuous professional development and support to overcome online learning challenges. Research suggests the importance of training programs, workshops, and mentorship opportunities to enhance lecturers' online learning competencies and foster a culture of continuous improvement (Shanks et al., 2022). The lack of technological competency among lecturers and inadequate infrastructure have been identified as common challenges. Lecturers may struggle with the effective use of online learning tools, limited access to technology, and unreliable internet connectivity, hindering their ability to deliver quality education (Kara, 2021). Online learning platforms may encounter technical glitches or inconsistent connectivity issues, causing disruptions during the teaching and

learning processes. Lecturers need technical support to troubleshoot and provide timely solutions to ensure uninterrupted teaching and learning. Continuous professional development opportunities should be provided to address this challenge.

Transitioning to online learning can increase the workload for lecturers, as they must develop online course materials, facilitate discussions, and provide individual support. The diverse learner population in TVET presents challenges for lecturers in online learning environments. Research highlights the need for personalised support, inclusive instructional design, and differentiated approaches to address students' varying needs, learning styles, and abilities (Haigh, 2020). Managing time effectively and maintaining a work-life balance can be challenging since they still have to provide face-to-face lectures during the day. TVET classrooms often comprise students with varying backgrounds, learning styles, and skill levels. Adapting lecturers to online teaching methods helps accommodate diverse online learning needs and provides personalised support when required.

Studies have highlighted the challenges lecturers face in adapting their pedagogical approaches to the online learning environment. Redesigning instructional strategies, incorporating active learning methods, and ensuring effective knowledge transfer pose significant hurdles (Annansingh, 2019). Lecturers should consider modifying instructional materials, assessments, and practical assignments to fit the online environment, ensuring alignment with learning outcomes and program requirements. TVET programs often require access to specialised equipment and resources that may not be readily available to students in an online learning setup. Lecturers face challenges in providing students with the necessary resources, simulations, or virtual laboratories to replace hands-on training adequately. Research suggests that effectively integrating multimedia, simulations, and virtual laboratories to replicate practical experiences remains complex (Lin, Barrett, Liu, Chen, & Jong, 2023). Designing and engaging interactive online learning content is a significant challenge for lecturers. On the contrary, some authorities suggest the benefits of online learning, such as remote teaching anywhere and anytime, cost-effectiveness, and increased access to information (Mwapwele, Marais, Dlamini, & Van Biljon, 2019; Parlakkiliç, 2017; Torres & Giddie, 2020).

2. Literature Review

TVET plays a crucial role in preparing individuals for the workforce, and the integration of online learning has transformed how education is delivered. This literature review examines the challenges faced by lecturers in the context of online learning. With the increasing adoption of online education, it is crucial to understand the hurdles lecturers encounter in delivering effective online learning experiences. The review explores relevant studies conducted globally, regionally, and in South Africa to identify key challenges lecturers face in adopting and implementing online learning methodologies and provides insights into potential strategies for overcoming them. By examining existing research, this review provides insights into the common challenges lecturers encounter worldwide.

Karani and Waiganjo (2022) conducted a desktop study on how COVID-19 affected lecturers and students and the opportunities gained during the pandemic. Online learning is aimed at overcoming physical barriers and promoting remote learning. Online teaching and learning rely heavily on the internet which acts as a communication medium. The study showed that online teaching and learning during COVID-19 in Kenya was challenging because most courses comprised hands-on subjects and colleges did not have the necessary tools for instruction (Karani & Waiganjo, 2022). A lack of electricity supply, poor internet connectivity, and power cuts were prevalent in rural areas, while those in urban areas could afford the internet and other gadgets. The study recommended an interest-free loan facility so underprivileged students could purchase ICT gadgets and be part of the learning initiative. Further, the TVET sector should collaborate and have a joint online learning platform to reduce high maintenance costs (Karani & Waiganjo, 2022).

Belaya (2018) studied the current state of research on online learning and developed recommendations for its better use in Vocational Education and Training (VET) in Germany. The study revealed that online learning offered flexibility in place, time, and learning pace. Besides the obvious benefits of saving on travel and accommodation costs and flexibility in the choice of location and space, the study revealed the challenges of a lack of high-speed internet, computers, laptops, or smartphones (Belaya, 2018). The study also showed that online learning deprived students of social skills, so they could not benefit from the social dynamics. The study recommends the redesign of pedagogical concepts explicitly for online learning.

Bączek et al. (2021) studied Polish medical students' perceptions of online learning during the COVID-19 pandemic and revealed continuous access to online learning material accessible at any time. However, there was a lack of interaction with patience and ICT technical glitches experienced during learning. Online learning may reduce opportunities for interaction and collaboration among students, hindering the development of teamwork and interpersonal skills (Lu & Smiles, 2022). Lecturers face challenges in promoting engagement, facilitating group work, and fostering a sense of community in virtual environments. Technical issues included interrupted internet connectivity, a lack of hardware and software, and ICT support. According to the TPACK framework, specific technological tools (hardware, software, and applications) are best utilised to guide and instruct TVET students towards a more robust understanding of the subject matter content (Koehler & Mishra, 2009). Online learning was considered less effective than face-to-face learning in increasing the acquisition of practical skills. Belaya (2018) supports the idea that certain topics are unsuitable for online teaching. Gamification was recommended so that game design elements are employed in non-game contexts to boost online learning interactivity (Oliveira et al., 2023).

Online learning revived the continuity of teaching and learning during the peak of the COVID-19 pandemic. Henaku (2020) investigated Ghanaian college students' online learning experiences and perceptions. The main challenges reported were internet connectivity, the high cost of internet data bundles, and devices. Due to surmountable challenges such as poor network connectivity, a high cost of internet bundles and a shortage of devices, the study recommended a suspension of online learning until the associated challenges are minimised. Online learning is considered an effective way of improving the quality of teaching and learning in the TVET

sector due to its various forms. Nevertheless, there is some disagreement in the literature on the advantages and disadvantages of online teaching and learning in the TVET sector.

Hondonga, Chinengundu, and Maphosa (2021) investigated the challenges of online teaching of TVET courses in Botswana during the COVID-19 pandemic. The study was quantitative and gathered data from lecturers and students. The findings indicated that most TVET colleges did not have online learning platforms, on the one hand. The lecturers were reported as lacking adequate preparation to use the online platforms for teaching. Additionally, a lack of computers and laptops, internet connectivity, and training for online learning platforms limited online engagement (Hondonga et al., 2021). Bates (2015) concurs that online teaching and learning require resources that include internet connectivity, a webcam, headsets, and a laptop or smartphone. The study recommended training on using learning management systems (LMS) and finding ways to encourage resistant and attitudinal lecturers to transition from traditional methods to online teaching. However, it is difficult to change the behaviour, culture, and routine of lecturers and other stakeholders (Parlakkiliç, 2017). The availability of these resources enables online teaching and learning to occur, and without them, a lesson may not be conducted.

Aina and Ogegbo (2022) explored TVET lecturer experiences in transitioning from traditional to online teaching during and after the COVID-19 pandemic in South Africa. The study employed semi-structured interviews and thematic data analysis. The study revealed a lack of support for integrating technology into online teaching. Other challenges noted include internet access, a lack of training on online pedagogies, and a poor policy framework for online learning implementation. Students from rural areas could not access online classes due to poor network connectivity and power cuts. These challenges threaten the lecturers' desire to transition to online learning (Aina & Ogegbo, 2022). The study recommended that the TVET management provide training and support for the lecturers to ensure efficient pedagogical practices that enhance online learning. Lecturers face the challenge of adapting their pedagogical approaches to the online learning environment. They need to reimagine hands-on and practical training methods to ensure students develop the necessary technical skills remotely.

The literature review found that students valued the following aspects of online learning: flexibility to choose location, timing, and pace of learning; reduction of the learning time by individualisation of the learning content; increased motivation to learn through multimedia presentations, access to online libraries, and the use of virtual classrooms; and elimination of travel and accommodation costs. However, learners also need to consider some risks: Online learning requires self-discipline and media literacy, can trigger an addiction through excessive use of electronic media, slows the development of social skills through the spatial isolation of participants, and requires the workplace to be technically equipped.

This literature review highlights the key challenges faced by lecturers in the realm of online learning. It emphasizes the need for comprehensive support, professional development opportunities, and infrastructure investment to overcome these challenges. By addressing these issues, TVET institutions can enhance the quality of online learning experiences once these challenges are addressed and effectively prepare students for workplace demands.

3. Methodology

The qualitative research gathered data from 35 TVET lecturers who were conveniently and purposefully selected. The lecturers who responded were sufficient to provide valuable insights into the challenges faced in the online learning context. The participants were most accessible to the researcher and had opinions and experiences of online learning. The combination of convenient and purposeful sampling allowed for the selection of participants who were accessible to the researcher and had relevant opinions and experiences with online learning. Data were gathered using an online survey, a semi-structured questionnaire that lecturers had to give their free responses to. Using participant observation as a data-gathering tool adds depth to the study by enabling the researcher to observe the lecturers' experiences and interactions first-hand in the online learning environment. This method allows for a richer understanding of the challenges lecturers face, as it captures real-time behaviours, practices, and dynamics. Participant observation also provided for confirmation and triangulation of the findings.

Thematic analysis was used to analyse data. The process included:

1. Familiarisation with the data: The researcher immersed himself in the data, reading and re-reading it to become familiar with its content and gain a holistic understanding of the responses (Aditya, 2021).
2. Coding: The researcher begins by generating initial codes, which represent concepts, ideas, or patterns within the data (Deterding & Waters, 2021).
3. Searching for themes: The researcher reviewed and compared the codes to identify potential themes. Themes are recurring patterns or concepts that capture key aspects of the data and reflect the research objectives (Braun & Clarke, 2021).
4. Reviewing and refining themes: Researchers review and refine the identified themes, ensuring they accurately represent the data and capture the richness of participants' experiences. Themes may be merged, split, or discarded during this process (Merriam & Tisdell, 2015).
5. Defining and naming themes: Researchers generate clear definitions and names for each identified theme, articulating their meaning and significance within the research context (Kiger & Varpio, 2020).
6. Reporting: Researchers document and present the thematic analysis in a comprehensive report or academic paper, including quotes or excerpts from the data to support the identified themes (Braun & Clarke, 2021).

The thematic analysis allows researchers to uncover patterns, insights, and understandings from qualitative data and provides a highly flexible approach that can be modified for the needs of many studies, providing a rich and detailed yet complex account of data (Braun & Clarke, 2021). It is a flexible method applicable to various types of data, including interviews, focus groups, observation notes, and documents, making it suitable for exploring the challenges lecturers face in online learning. Using thematic analysis, researchers could gain a deeper understanding of lecturers' experiences, perceptions, and perspectives and derive meaningful conclusions from the data.

Overall, this research design offers a qualitative lens into lecturers' challenges in online teaching and learning. By gathering data from a selected group of lecturers and utilising participant observation, the study provides in-depth insights and perspectives that contribute to our understanding of the complexities surrounding online learning implementation in TVET settings.

4. Theoretical Framework

While several theories and instructional approaches inform and guide teaching using online learning, the study employed the Technological Pedagogical Content Knowledge (TPACK) framework for teacher knowledge by Koehler and Mishra (2009) to unpack the research findings. Rodríguez Moreno, Agreda Montoro, and Ortiz Colon (2019) describe TPACK as the lecturer's knowledge to develop didactic strategies using technology to facilitate learning. Therefore, TPACK includes the knowledge of pedagogical strategies that use technologies to teach subject content and apply knowledge that simplifies the learning content. TPACK is a framework that emphasises integrating technology, pedagogy, and content knowledge in educational settings. When applied to online learning, TPACK provides a lens through which educators can understand and leverage the unique intersection of technology, pedagogy, and content in online learning environments. Lecturers can leverage this theory by recognising the autonomy and self-directedness of adult learners. Providing opportunities for choice and self-paced learning, incorporating real-world examples and applications, and acknowledging the prior knowledge and experiences of students can enhance online teaching and learning engagement and motivation.

Figure 1 shows the seven components in the TPACK framework: technology knowledge, content knowledge, pedagogical knowledge, pedagogical content knowledge, technological content knowledge, technological pedagogical knowledge and technological pedagogical content knowledge. The framework shows the elements of lecturer knowledge that assist in describing effective teaching.

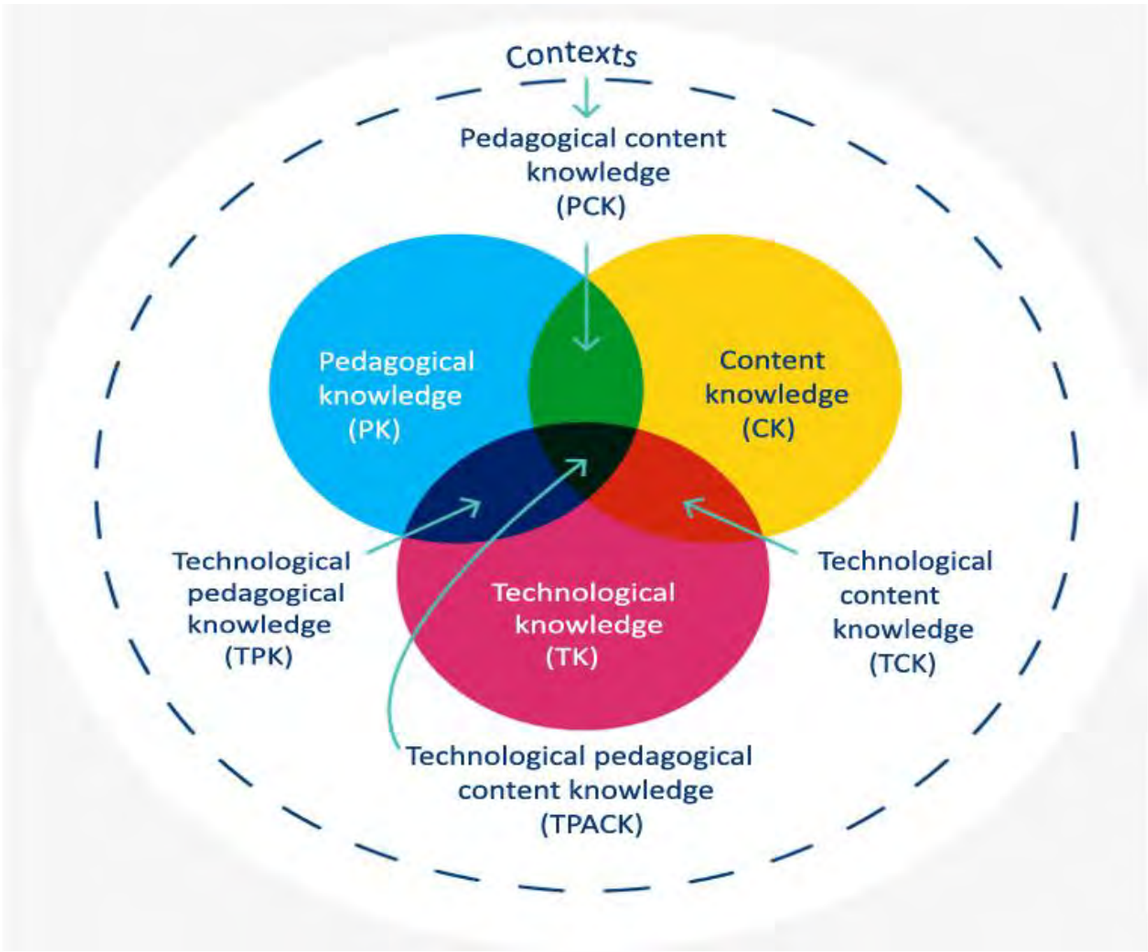

Figure 1. TPACK framework.

Source The TPACK Framework by Mishra, Warr, and Islam (2023).

Technological knowledge refers to understanding how technology tools and platforms work and being proficient in their use. In online learning, technological knowledge involves familiarity with learning management systems, multimedia tools, virtual collaboration platforms, and other digital resources commonly used in online education. Pedagogical knowledge involves understanding instructional methods, strategies, and approaches that facilitate effective teaching and learning. In online learning, pedagogical knowledge includes instructional design principles, online facilitation techniques, and strategies for promoting active engagement and interaction among learners in virtual environments (Mishra, 2019). Content knowledge refers to deep knowledge and understanding of the subject matter being taught. In the online learning context, it includes expertise in the specific content areas being delivered online, as well as the ability to adapt and present content in a way suitable for digital delivery (Schmidt et al., 2009).

Therefore, TPACK represents the overlapping knowledge domains of technology, pedagogy, and content and how they interact in online learning environments. It goes beyond the isolated knowledge of technology, pedagogy, or content and emphasises the integration of all three domains to create meaningful and effective learning experiences in online settings. In online learning, lecturers with strong TPACK can leverage technology to enhance pedagogical approaches and deliver content in engaging and interactive ways. They can select appropriate digital tools and resources to support instructional objectives, design effective online learning activities, and provide timely feedback and support to learners. Furthermore, TPACK allows lecturers to adapt and customise content to fit the online context, considering the unique affordances and constraints of the digital environment. Therefore, TPACK in online learning promotes integrating technology, pedagogy, and content

knowledge, enabling educators to create engaging, interactive, and effective online learning experiences for their students. By merging these knowledge domains, lecturers can create meaningful and impactful student learning experiences.

The TPACK framework is important because it brings to light the benefits of technology in the classroom. Furthermore, TPACK paves the way for lecturers to engage students in collaborative learning and to develop the digital pedagogy concept (Maor, 2017). The framework promotes understanding of the synergy between pedagogy and technology (Dahal et al., 2022). TPACK can assist lecturers in thinking strategically about the application of technology in the classroom.

5. Results

According to the survey on online learning, TVET lectures face a number of difficulties, and other significant findings emerged. These findings shed light on the common obstacles encountered by lecturers in adopting and implementing online learning methodologies. A presentation of results follows next under limited access to resources and equipment, communication and interaction, assessment and evaluation, technical difficulties and troubleshooting, time management and workload, professional development, and implications for implementation.

5.1. Limited Access to Resources and Equipment

Access to resources and equipment was reported as a challenge by Tutor 1, who said, "*I had no laptop, no data, and no experience with Microsoft Teams.*" Most lecturers pointed to the unavailability of data as an impediment to online learning. Besides the data outcry, Tutor 2 indicated a "*lack of resources, e.g., cameras or online teaching boards,*" which made it difficult to execute their functions. In terms of accessing the teaching and learning platform, Tutor 3 said:

> *I experienced difficulties logging in. There are challenges since I am not the online learning platform host.*

Highlighting online learning issues and challenges, Tutor 4 pointed out "*poor attendance, load shedding factor (it affects connectivity), challenges of having data for both tutor and learners, and lack of quality training.*" Other tutors raised the same sentiments shown in the excerpts below:

> *I was using my data. My employer did not provide me with data, so I sometimes struggled to connect* (Tutor 5).
> *I did not have the resources to attend online classes* (Tutor 6).
> *Low attendance from learners. Not having data to conduct a lesson, even for us as lecturers* (Tutor 8).
> *Low student attendance, not being able to get registers of students. I'm not able to write while you explain* (Tutor 9).

Online learning was hampered by a lack of "resources like a projector, sufficient data, and a whiteboard at home" (Tutor 10). Tutor 12 further explained that "students find it difficult to join the link due to the phones they are using and shortage of data." Tutor 13 clarified the connectivity issue by explaining:

> *Lectures had problems with routers. Sometimes we were unable to connect. The shortage of data was a problem as well.*

Tutor 15 indicated that:

> *Most learners could not attend our classes because of a shortage of data. As a lecturer, I had to dig deep into my pockets to buy data I used for all the online sessions I had with the students.*

Furthermore, Tutor 17 added:

> *Load shedding and data would be our worst enemies. What we are being provided by the college is not functioning. I reported it, but nothing was done.*

A college offered a wide range of courses, both theory and practical-oriented. In response to practical engagements during online learning, Tutor 18 commented:

> *Some subjects need contact sessions, especially the drawings. It is important to attend online training courses to gain skills to handle the classes.*

Tutor 19 said:

> *I still prefer 50% online learning. I am unsure if online learning will suffice; students need physical contact sessions to take things in series and do sketches on the whiteboard. Live teaching instils confidence because it significantly differs from student and lecturer perspectives, especially when some students are left behind during face-to-face teaching and learning.*

In terms of conducting assessments, Tutor 21 reported:

> *It will be difficult to detect if a student copies something from someone else during an assessment because of a lack of appropriate software.*

Tutor 29 lamented that "*load-shedding is a problem for everyone. There is weak or poor signal, especially in the homelands and locations.*"

Tutor 30 indicated "*late knockoff and load-shedding*" as reasons for failure to engage in online classes, while Tutor 31 showed that "*a lot of time is needed to type and prepare meaningful teaching material.*"

Online learning requires a good command of computer skills. As such, Tutor 33 pointed out that "*lacking new skills and resources for online preparation*" was a deterrent to learning.

Tutor 34 said:

> *Everyone is still learning about this type of teaching and learning, but I managed to run the programme very well because I did my whole course at the university online. Other students could not join us due to different home environments, such as a lack of smartphones, data, and networks and a problem with load-shedding.*

Lecturers reflected on various staff development aspects in which they wanted to update their computer skills. Results showed that PowerPoint and Microsoft Teams were highlighted as the most important courses necessary to empower lecturers with soft skills.

On a positive note, some participants shared similar sentiments and said:

> *Online learning is good because it helps me teach more chapters of the syllabus (Tutor 35).*
> *It helps to conduct more lessons (Tutor 20).*

I found it helpful as more subject content can be covered (Tutor 23).

Tutor 25 summed up the discussion and said:

Overall, I recommend continuing with both physical contact sessions and online teaching and learning because it gives students more opportunities to raise concerns or catch up on things that were difficult to catch during contact sessions. It also allows us as lecturers to finish up all modules or syllabi for students to write exams.

From a 2023 strategic planning meeting, the following challenges were presented for the college under study:

- Access to all students and lecturers.
- Challenges with syncing enrolled students to the LMS.
- The reluctance of lecturers to use the LMS.
- Unavailability of data.
- The synergy between the management information system and the LMS host company.
- Monitoring of the online session.

The list of challenges brings to the fore the surmountable deterrents that require decision-makers' interventions to engage in working solutions to online learning.

6. Discussion of Findings

It emerged from the findings that all tutors experienced load-shedding and connectivity challenges. Over the years in South Africa, load-shedding has become a chronic pain and a national crisis that impedes such innovation. Regarding connectivity, the college could consider engaging service providers offering data-free LMS to enhance user access.

Access to resources and equipment was limited since some tutors did not have gadgets and software to enhance their lesson presentations. Findings are in tandem with Rashid et al. (2016) who acknowledge technological obstacles such as access to the internet and computer and technology equipment. In agreement, Schilke (2001) echoed that technological obstacles included a low internet network, a lack of technical skills and support, and login challenges. A lack of ICT support is attributed to the difficulty in accessing the LMS. Similarly, Aina and Ogegbo (2022) concur that support for technology integration and limited access to connectivity threaten the transition to online learning. The findings show conformity with the Department of Higher Education and Training (DHET) (2017) that the realities of ICT infrastructure, such as software, connectivity costs, a lack of support, and the capacity of lecturers to use technology in their teaching methodologies are hampering the take-off of online learning. Koehler and Mishra (2009) posit that technological content knowledge improves how lecturers create and manipulate content, which can change how students understand syllabus concepts.

Through TPACK, lecturers integrate technological aspects into their teaching. However, a shortage of resources impacts the quality of the delivery of teaching and learning (Karani & Waiganjo, 2022). The findings show conformity with Aina and Ogegbo (2022) who revealed that no support and resources were provided to lecturers for online teaching, and they often complained about data and laptops (UNESCO, 2020). Ensuring quality assurance in online learning delivery is important. Lecturers must maintain academic standards, assess learning outcomes effectively, and ensure programme compliance in accordance with online learning guidelines while operating within the virtual environment. Online learning becomes effective when the correct tools and equipment are used. Delivering subjects like engineering drawing was challenging due to limited educational technology, such as a real-time projector and related software. It was further observed that a lack of preparation before online engagement created glitches that could have been avoided. The findings of this study confirm Koehler and Mishra (2009) who revealed that lecturers have an inherent understanding of the connectedness between content and pedagogical and technological knowledge by delivering content using applicable pedagogical approaches and technologies.

Most participants indicated load-shedding and poor connectivity as deterrents to engaging in online teaching and learning. Load-shedding, in South Africa, refers to the unavailability of electricity supply due to a shortage from the national generating power sources. Findings align with Karani and Waiganjo (2022) who found conducting online classes with poor internet connectivity and electricity power cuts difficult. Generally, it has become common that network connectivity weakens when the electricity cuts off. Due to continuing power cuts, some tutors and students failed to connect, negatively impacting online teaching and learning.

Other challenges highlighted are related to workload and time management. The findings dovetail with Hondonga et al. (2021) and UNESCO (2020) who showed that lecturers were resistant to preparing online teaching material as they felt it gave them an extra workload. It emerged that online learning demanded much preparation of presentation slides because a well-presented online lesson depends on the shared document, which links the tutor and students. Without a shared presentation, online lessons were observed as boring and lacking connection with students. Some tutors may be shying away from online lesson preparation due to fear of the new initiative. In many instances, teaching in TVET is done through the lecturer method, where lecturers use textbooks to teach. Technological pedagogical knowledge prepares lecturers to learn how different technologies can be applied in teaching and how technology improves their teaching (Koehler & Mishra, 2009; Schmidt et al., 2009). Online learning demands adequate preparation before lesson delivery, which implies that students are likely to receive quality and updated information from the tutor. The findings concur with a study by Hondonga et al. (2021) who linked the failure of lecturers to connect to online classes to a lack of preparedness to deliver effective lessons. The World Bank (2020) points out the lack of staff development and resistance to change from traditional teaching methods as causes for failure to adequately prepare for online teaching.

The success of any educational endeavours lies in well-groomed educators who can adequately prepare relevant content and effectively use technology to deliver content. Tutors indicated "*lacking new skills and resources for online preparation*," which prevented them from making appropriate learning materials and utilising all the provisions of the LMS. Literature attests to the importance of infrastructural resources, which include smartphones, tablets (Belaya, 2018) internet connectivity, laptops, and computers (Bates, 2015; Hondonga et al., 2021). The findings raised the need for training on PowerPoint, LMS, Excel, and online teaching etiquette. The study showed that tutors lacked training on the LMS and Microsoft proficiency. Lack of technological competency and inadequate

infrastructure pose significant challenges for lecturers. Koehler and Mishra (2009) refer to technology knowledge as the internet, interactive whiteboards, digital videos, and some software programmes. Lecturers require training and support to effectively utilise online learning tools and platforms and access reliable internet connectivity and appropriate gadgets. The shortfall prevented the flow of online lessons since they could not logon on time and failed to upload their presentations. It impacted students' willingness to engage in online learning, as they would be tempted to compare it with the traditional learning method.

TVET lecturers require ongoing professional development and support to enhance their online learning competencies (Yeap, Suhaimi, & Nasir, 2021). Access to training programmes, workshops, and resources specifically tailored to TVET online learning is crucial for effectively addressing challenges. TPACK framework may potentially impact the professional development experiences of lecturers (Koehler & Mishra, 2009; Schmidt et al., 2009). The finding correlates with the literature that lecturers should be trained to use online learning methodologies (Aina & Ogegbo, 2022; Hondonga et al., 2021). Creating engaging and interactive content is essential to sustaining student motivation and involvement in online learning. Lecturers should design multimedia-rich teaching materials, simulations, and virtual laboratories that effectively replicate the practical aspects of vocational training. Since the TVET courses encompass diverse students with different backgrounds and learning needs, the lecturers should ensure that online learning strategies are inclusive, providing personalised support and accommodating different learning styles and abilities.

Besides the many challenges of online learning, some valuable benefits are praiseworthy. It was stated that online learning "*helped to teach more chapters of the syllabus*," meaning that more content was covered, increasing chances of success in the final examination. Covering more syllabi content could also mean that students learnt most of the subject matter, which increased their discipline knowledge and moulded them into better artisans. To achieve this, lecturers need pedagogical content knowledge (Shulman & Shulman, 2004), which blends content and pedagogy to develop improved teaching practices (Koehler & Mishra, 2009). Multiple pedagogies, technologies, and other learning resources are considered effective online teaching and learning strategies that address different student learning needs and promote student interaction through online networking (Lockman & Schirmer, 2020).

6.1. Implications for TVET Lecturers

1. Pedagogical Adaptation: TVET lecturers need to adapt their teaching methodologies to effectively engage students in an online learning environment. This includes designing interactive online activities, using multimedia resources, and fostering collaborative learning through LMS platforms.
2. Continuous Professional Development: To address the challenges of online teaching, TVET lecturers need continuous training and development. The training involves enhancing their technological expertise, digital content creation skills, and familiarising themselves with different online teaching tools.
3. Innovative Assessment Strategies: Traditional assessment methods may need restructuring to suit the online learning environment. Lecturers should explore alternative assessment methods, such as project-based assessments, online quizzes, and peer evaluations, while maintaining academic integrity.
4. Research and Best Practices: Lecturers have an opportunity to contribute to the scholarship of online TVET teaching by conducting research on effective online pedagogies, sharing best practices, and developing innovative approaches to address challenges.

6.2. Implications for Industry Personnel

1. Collaboration with lecturers: Industry personnel could collaborate with TVET lecturers to bridge the gap between theoretical knowledge and practical application. They could also provide models, real-world insights, case studies, and industry-specific challenges to enrich online TVET teaching and learning.
2. Feedback and Alignment: Feedback from industry personnel on the relevance and applicability of online course content is invaluable. Their involvement could ensure that the TVET curriculum remains aligned with industry trends, enhancing students' employability.
3. Guest Lectures and Workshops: Industry experts could contribute to online courses by delivering guest lectures, participating in online discussions, or conducting virtual workshops. Students could gain first-hand insights into industry practices.
4. Resource Sharing: Sharing industry-specific resources and opportunities for excursions could enhance the quality of online teaching and learning and expose students to authentic industry-specific scenarios.

The implications of online teaching and learning challenges for TVET lecturers have far-reaching effects on lecturers and industry personnel. Adapting pedagogies, continuous professional development, innovative assessments, and industry collaboration are essential to address these challenges and ensure a holistic and effective online learning experience for TVET lecturers and students. The collaboration and partnership of lecturers and industry personnel could shape the future of TVET education in the digital age.

7. Conclusion and Recommendations

It emerged that COVID-19 accelerated the implementation of online learning after institutions were physically closed. The common challenges among the studies visited in the literature were connectivity, data, and devices to use. The issue of limited access to resources and equipment cannot be overemphasised. It followed that the challenges are common among different nations. Hence, on a global scale, governments should take the initiative to seek lasting solutions to these challenges. Lecturers reported limited practical training on how to use the LMS as well as technical ICT difficulties and connectivity issues. The TVET colleges should promote collaboration and teamwork among their counterparts to ensure good practices are spread within the sector.

The findings suggest that the online learning initiative was an abrupt and forceful move where virtual teaching and learning were affected without adequate resources. Results suggest that it was a forced change.
The study recommends the following:

- TVET lecturers require ongoing professional development and support to enhance their online learning competencies.

- Colleges should engage zero-rated LMS platforms to solve internet data challenges.
- TVET lecturers should receive adequate resources that support online learning.
- TVET management should engage curriculum implementers before purchasing an LMS to encourage positive engagement.

The paper concludes by proposing a new policy and paradigm shift in TVET post-COVID-19 pandemic.

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