PERSPECTIVES ON CHALLENGES ASSOCIATED WITH THE ADOPTION OF ONLINE TEACHING AND LEARNING IN PRACTICAL SUBJECTS

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ABSTRACT

The rapid development of technology has significantly transformed the field of education, particularly with the integration of Online Teaching and Learning (OTL) facilitated by Information and Communication Technologies (ICT).

However, some disciplines, such as Consumer Studies (CS), have encountered distinctive challenges due to their specialised nature as a practical subject. Furthermore, there is limited literature on the effectiveness of OTL in practical subjects such as CS. Hence, the paper aims to investigate the challenges associated with the adoption of OTL in practical subjects similar to CS. The study conducted a bibliometric study in which literature was drawn from electronic databases covering topics such as OTL pedagogy, challenges in practical subject implementation of OTL, and teachers' perspectives on OTL.As a result, 17 publications were chosen to meet the study's aim.

Based on the unified theory of acceptance and use of technology, the study reveals that practical subjects like CS demand robust facilitation, relevant pedagogical approaches, and sufficient online resources for effective adoption and implementation of OTL. Furthermore, It is recommended that policymakers revise the practical subject's curriculum to incorporate strategies tailored for OTL. Additionally, the government needs to support schools by providing them with the required resources to ensure the successful adoption of OTL.

KEYWORDS

online teaching and learning, consumer studies, pedagogy, practical subject, teacher training

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ARTICLE INFO

Submitted November 2024
Revision February 2025
Accepted February 2025

DOI: https://dx.doi.org/10.4314/jfecs.v53i1.282868

INTRODUCTION

The transition to Online Teaching and Learning (OTL) during the COVID-19 pandemic significantly affected education, particularly for practical subjects reliant on hands-on learning, such as Consumer Studies (CS), Culinary Arts, and Technical Education. Galhotra *et al.* (2023) noted that OTL provided access to and continuity of education during lockdowns, but its use in delivering practical subjects is still quite challenging. Svatos *et al.* (2022) noted that these subjects demand active involvement and practical learning, which is challenging to do effectively. Teachers in these fields faced unique obstacles, including adapting to new technologies, creating virtual simulations, and finding alternative methods to impart practical skills.

Dhawan (2020) underlined the role of OTL in creating educational and training access for those who would otherwise be geographically or physically challenged. The increasing power of Information and Communication Technlologies (ICT) is increasing the feasibility of OTL (Palvia *et al.* 2018) and expanding the applicability of OTL to populations with varying needs. The interest in OTL has surged among global educational stakeholders, including teachers and policymakers. Kentnor (2015) traced OTL's origins to the 1990s, driven by the information superhighway's aim of connecting people and reducing travel. Seaman *et al.* (2018) observed that OTL has consistently grown and accelerated over a span of 14 years, particularly in the USA, leading to a decline in the number of learners opting for traditional classes. In Africa, despite South Africa's implementation of a tested e-education since 2003, challenges in its its interpretation and execution have hindered broader adoption, especially among rural populations (Vandeyar 2015; Kotoua *et al.* 2015). Similarly, while Ghana benefits from good internet connectivity, it faces its own unique challenges with OTL.

In many African nations, OTL has proven beneficial for employees, enabling them to acquire and improve skills without leaving their jobs (Haleem *et al.* 2022). While OTL was extensicvely utilised this year to rescue the academic year during the COVID-19 pandemic, research indicates that it is generally viewed unfavourably due to technological constraints and lack of professional development for instructors (Baticulon *et al.* 2021; Tesar 2020; Hodges *et al.* 2020). This paper examines the challenges faced by practical subject teachers in adopting OTL. It underscores the necessity for both teachers and learners to rceceive adequate training in the use of OTL (Ja'ashan 2020). Furthermore, it aims to propose solutions to these challenges, ensuring that CS lessons fully leverage OTL within the globalized context in which learners operate. Proficiency in OTL is particularly crucial for secondary school learners, as it is widely utilized in universities and serves as an essential skill in the global job market.. The study seeks to illuminate the specific problems practical subject teachers encounter when transitioning to OTL and to provide insights for the Department of Education (DE). Chigora *et al.* (2022) highlight the critical role of government in resource allocation and OTL implementation in schools. Similarly, Ismael (2021) emphasizes the importance of studying successful models from other countries to inform OTL practices in applied fields. Overall, this work contributes to the development of future guidelines for the routine use of OTL in applied contexts. It

addresses how educational models for practical subjects can be improved and provides recommendations to bridge the gaps in the existing OTL literature.

LITERATURE REVIEW

Understanding Consumer Studies as a subject

CS is a multidisciplinary subject that integrates various fields, including consumer behaviour, economics, health, and activities related to consumer development, such as consumer rights and household management. It equips learners with academic skills, enabling them to perform competently and critically in both their professional and personal lives (Ngwenya & Shange 2019). According to Booyse *et al.* (2013), CS has the potential to make significantpositive contribution to South African society by providing learners with extensive opportunities for experiential learning, especially in a context of high unemployment. Furthermore, Du Toit (2019) notes that CS aim to equip learners with the skills, values, attitudes, and knowledge necessary to create and sell food, clothing, and furnishing items that cater to consumers needs. This highlights the importance of fostering entrepreneurial skills through the creation and sale of small-scale items in selected real-world scenarious. Exposure to practical, real-world situations allows learners develop hands-on knowledge and skills that are invaluable for their future career pursuits (Ngwenya & Shange 2019).

CS also supports sustainability by emphasising responsible consumption, ethical desicision making and environmental stewardship. Therefore, by integrating these concepts, CS improves consumer education by raising awareness about sustainability living and ethical consumption habits (Jackson 2014; Thoresen 2017). Nevertheless, the CS subject demands well-trained, qualified teachers, adequate access to resources, effective delivery of learning content, and a curriculum that successfully facilitates teaching and learning. In their study, Du Toit (2021) found that CS subject is also offered in South African neighbouring countries such as Botswana, Lesotho, Namibia, Swaziland, and Zimbabwe. However, they use different names, such as Home Economics, Food and Nutrition, and Home Management. This subject is also offered internationally in Slovenia, Dublin, Australia, and Indonesia (Erjavsek 2021; Geraghty 2021; Pendergast 2021; Kuswardinah *et al.* 2020). This implies that that CS empower learners to make informed decisions regarding their purchasing choices, lifestyle, household management practices, and eating habits. Furthermore, it highlights the relevance and significance of Consumer Studies as a critical and substantive field in the current context of the country.

According to Ngwenya and Shange (2019), CS face numerous challenges that hinder the effectiveness of teaching and learning. These include inadequate teaching and learning resources, such as textbooks, a shortage of qualified practical subject teachers, insufficient equipment, poorly equipped kitchen laboratories, and limited government funding, which remain persistent issues even today (Du Toit & Goosen 2024). Additionally, the COVID-19 pandemic exposed the vulnerabilities of practical subjects like CS when transitioning to OTL (Galhotra *et al.* 2023).

Elhaty *et al.* (2020) observed that the impact of OTL on learners' achievement in practical subjects varies across factors such as the quality of the online course, the subject area, the availability of resources, and learners' learning styles and intentions. Due to the hands-on nature of the discipline, subjects like CS are not easily adapted to online platforms. Challenges include inadequate online tools,

barriers to providing individualized feedback, technical issues, and a lack of teacher support for effective remote learning (Baticulon *et al.* 2021; Du Toit & Goosen 2024). Since CS became part of the South African curriculum and the integration of OTL into the curriculum, there has been limited research addressing the adoption of OTL in practical subjects. Therefore, this study seeks to fill the gap in the existing literature by exploring the adoption and effectiveness of OTL in practical subjects.

Online teaching and learning

OTL refers to to the use of digital technologies to deliver various pedagogical approaches, including the internet, videos, and animations, as noted by Hussin (2017). Sadiku *et al.* (2018) offer a straightforward translation, defining OTL as online learning. Albrahim (2020) extends the notion of OTL to include fully or partially digital teaching, encompassing online and blended learning. In a similar vein, Haron *et al.* (2021) present OTL as a strategy that enables interaction between teachers and learners via technology, often remotely. Oliveira *et al.* (2019), as well as Allen and Seaman (2013) consider OTL to be internet-based teaching, which encourages the development of knowledge. Raheim (2020) elaborates that OTL allows knowledge acquisition through personal experience or direct teaching in an internet-based environment, utilising various technologies. The performance of OTL is strongly dependent on ICT as pointed out by Mansor *et al.* (2021). Ratheeswari (2018) notes that the essential ICTs are the internet, wireless networks, and digital tools. Hasifah (2020) advocates for the adoption of OTL, by emphasising the importance of adopting these new paradigms. Authors noted that OTL encourages independent exploration and knowledge construction.

OTL provides people working in remote locations or those with physical challenges access to education and learning materials at any time. (Harrison & McTavish 2018). This allows learners to choose their learning pace and direction, facilitating independent resource access and personalised learning goals (Ngesi *et al.* 2018). They can revisit complex issues using recordings and audio media until they are sure what they understand (Samat *et al.* 2020).The adoption of OTL has expanded from developed to developing countries, experiencing significant growth in the twenty-first century (Sethosa 2021). Nations such as the United States, India, China, South Korea, Malaysia, the United Kingdom, Australia, and South Africa have incorporated OTL into their educational frameworks (Zalat *et al.* 2021). In these countries, OTL has proven to be a platform for cultivating intelligent, lifelong learners prepared for the demands of the information age (Nasson 2020). However, certain African countries, including Ghana, Nigeria, and South Africa, continue to face challenges in fully integrating OTL into their educational systems (Monareng *et al.* 2021; Nwokeocha 2021). While there has been some progress, the persistent need for stronger government support is evident (Letseka *et al.* 2018). Dube (2020) emphasizes that challenges should not deter these nations from pursuing the successful implementation of OTL, suggesting they can learn from successful international models.

Tools and resources for online teaching and learning

Hazwani *et al.* (2017) emphasised the critical importance of internet availability for the optimal performance of OTL, while Basar *et al.* (2021) highlighted the cost barriers that limit internet availability in some schools. Effective communication is vital to teaching SC, and online technologies enhance this (Sodhar *et al.* 2020). Despite its usefulness, engaging with large learner populations can

be challenging. Tools like MS Teams, Skype, and Zoom facilitate wide distribution through video conferencing, messaging, and audio education, all accessible on various devices (Basar *et al.* 2021). Additionally, social media provides a significant platform for teachers to interact with learners, offering instant communication (Albrahim 2020). Online communities on these platforms foster discussion and collaborative learning, with WhatsApp groups enabling collective learner engagement (Sodhar *et al.* 2020). However, for optimal effectiveness, teachers must be strategically engaged in these networks (Sodhar *et al.* 2019). Moreover, multimedia is crucial for integrating OTL into curricula. Pavithra (2018) defined multimedia as the combination of text, sound, images, and interactivity, and Samat *et al.* (2020) outlined its numerous potential teaching applications. Tools such as PowerPoint, interactive whiteboards, and platforms like YouTube can enhance teaching effectiveness (Kumi-Yeboah *et al.* 2020) and facilitate lesson dissemination and review (Kumi-Yeboah *et al.* 2020), promoting learner-driven learning (Oliveira *et al.* 2019; Margaret *et al.* 2018). .

Theoretical framework: Unified theory of acceptance and use of technology

Literature indicates that OTL offers numerous benefits. However, some teachers still resist adopting technology in teaching and learning. As a result, researchers have developed various models to promote technology acceptance. Marikyan and Papagiannidis (2023) noted that these models and theories have been applied across various disciplines, including education, medicine, and finance, to investigate the factors influencing technology adoption. Furthermore, the success of adopting new technology depends significantly on individuals' willingness to embrace specific technologies (Aytekin *et al.* 2022). Chomunorwa and Mugobo (2023) emphasise the importance of understanding the characteristics of learners in today's era, particularly Generation Z, who are technologically adept and rely on technology for learning.

Venkatesh, Morris, Davis, and Davis (2003) introduced the Unified Theory of Acceptance and Use of Technology (UTAUT), which consolidates various research efforts from multiple models and theories of Technology Acceptance (Chomunorwa & Mugobo 2023). According to Marikyan and Papagiannidis (2023), UTAUT posits that the use of technology is driven by behavioural intention. This suggests that policymakers and educational stakeholders should be mindful of teachers' behavioural intentions when it comes to using technology in the classroom. Moreover, teachers' behavioural intentions play a crucial role in guiding the effectiveness and success of technology use in education. The UTAUT is viewed as an attempt to harmonize the terminology of variables from different models and theories of technology acceptance (Chomunorwa & Mugobo 2023). According to the UTAUT model, four constructs serve as critical predictors of information system usage (Venkatesh *et al.* 2003):

- Performance expectancy: This construct implies that teachers must believe that adopting technology will enable them to perform their jobs at high levels.
- Effort expectancy: According to this construct, teachers are more likely to adopt and accept technology if its use is perceived to be easy.
- Social influence: This construct states that that teachers require motivation and support from others, along with reasons explaining the importance of adopting technology in their teaching.
- Facilitating conditions: In this construct, teachers need to see that they have the support of the school and the DE, including necessary resources and training.

In simple terms, the UTAUT suggests that teachers are more likely to adopt technology in their teaching or classrooms if they understand its benefits. This understanding encompasses how technology can improve their performance levels and includes hearing testimonials regarding its adoption and use. Additionally, teachers are more likely to accept technology if they possess the necessary skills to use it effectively and have access to all the resources required for successful adoption and integration into teaching and learning practices. However, it is also worth noting that lack of considering contextual and environmental factors influences technology acceptance (Venkatesh *et al.* 2012). Furthermore, the UTAUT places significant emphasis on performance expectancy and effort expectancy, while downplaying intrinsic motivational factors like personal interest and perceived enjoyment. The inclusion of moderating variables such as age, gender, and experience may oversimplify the complex interactions between users and technology, thus limiting its adaptability to diverse populations (Williams *et al.* 2015). Despite these drawbacks, UTAUT remains a valuable framework for understanding and facilitating technology acceptance in education. By incorporating insights from UTAUT and complementing them with additional contextual and motivational factors, teachers can develop more inclusive, targeted, and adaptive technology integration strategies. Through continuous improvement and adaptation, UTAUT can also provide a strong foundation for enhancing and expanding pedagogical experiences across a wide range of educational contexts.

Research question

To understand the challenges faced when adopting OTL, the following question is formulated to pilot the study: What are the challenges associated with the adoption of online teaching and learning in practical subjects, and beware of teachers experiences of OTL?

Aim and objectives

The aim of the study is to investigate the challenges associated with the adoption of online teaching and learning in practical subjects similar to Consumer Studies. The aim of this study will be achieved by exploring the impact COVID-19 had on teaching and learning methods, assessing implementation of OTL and examining teachers experiences with regards to online teaching. By doing this, the following objectives will guide the study:

1) To explore the impact of COVID-19 in regard to OTL uptake, to understand barriers to OTL implementation that teachers report to us.
2) To assess how OTL has been implemented successfully by teachers.
3) To examine teacher experiences in online teaching and learning.

METHODOLOGY

Bibliometric research, which is as defined by Pritchard (1969), uses a quantitative approach to analyse communication artifacts, enabling researchers to assess vast academic literature (Van Nunen *et al.* 2018). This process, which is ubiquitous in education and business management, provides information about the impact of the researcher, the comparison of institutions, and science communication (Torun 2023). The current study used bibliometric analysis to shed light on the problems practical subject teachers are encountering in adopting OTL and its effects on teaching effectiveness, specifically in hands-on subjects such as CS. In an effort to meet the aim of the study, the authors searched for resources from open-access journals and databases such as EBSCOhost, Google Scholar, and Scopus, looking at

TABLE 1: REVIEWED JOURNAL ARTICLES

Author	Title	Themes/Variables	Journal
Chomunorwa, and Mugobo (2023)	Challenges of e-learning adoption in South African public schools: Learners' perspectives	Educational technology, Challenges E-learning, Learner perspectives, Online learning, Poor communities	Journal of Education and E-Learning Research
Khoza (2021)	The Burden on Online Teaching and Learning in South African Secondary Schools: An Attempt to Respond to a New Normal	Teachers' perceptions, Challenges of online teaching and learning, ICT, COVID-19, Secondary school	Journal of Educational Studies
Chisango and Marongwe (2021)	The digital divide at three disadvantaged secondary schools in Gauteng, South Africa	Digital divide, Covid-19, secondary schools, disadvantaged communities, South Africa	Journal of Education
Makamure and Tsakeni (2020)	COVID-19 as an Agent of Change in Teaching and Learning Stem Subjects	Covid-19, mathematics and science, online learning, STEM education, virtual platforms	Journal of Baltic Science Education
Mukuna and Aloka (2020)	Exploring Teachers' Challenges of Online Learning in Covid-19 at a Rural School, South Africa	Online learning, COVID-19, Protection Motivation Theory, Rural school; Teachers' challenges	International Journal of Learning, Teaching and Educational Research
Dube (2020)	Rural Online Learning in the Context of COVID-19 in South Africa: Evoking an Inclusive Education Approach.	COVID-19, rurality, online learning, human rights, inclusion, Challenges of online learning	Multidisciplinary Journal of Educational Research
Maphalala, Mncube, and Mkhasibe (2022)	South African Secondary School Discussions on Digital Learning and Pandemic Preparedness	Digital divide, digital literacy online learning, teachers' and students' perceptions, COVID-19	International Journal of Higher Education
Rwodzi and De Jager (2021)	Resilient English Teachers' Use of Remote Teaching and Learning Strategies in Gauteng Resource-Constrained Township Secondary Schools	Digital literacy, digital platforms, e-learning; resource-constrained schools, remote learning, teacher resilience, TPACK, township schools	Perspectives in Education
Monareng, Beharry and Mashau (2020)	The Rise in Online Learning in South African Schools Due to the Coronavirus Pandemic	Blended Learning, Coronavirus, Online Learning, Education, Lockdown	Gender and Behaviour
Skhephe and Mantlana (2021)	Accounting teachers' voices on factors affecting online teaching during the 4th Industrial Revolution in the face of COVID-19 in selected high schools in the Eastern Cape, South Africa.	Teachers' voices, online teaching, teacher's readiness, 4th Industrial Revolution, connect policy COVID-19	Research in Social Sciences and Technology
Skhephe (2022)	The Virtual Classroom: Challenges of COVID-19 Pandemic in Accounting Subject Classrooms in the Eastern Cape Province, South Africa	Accounting classroom challenges, COVID-19, online teaching, teaching and learning	African Perspectives of Research in Teaching and Learning,
Dube-Xaba (2022)	Emergency Remote Teaching and Learning of Tourism during COVID-19 in Rural Secondary Schools	Digital platforms, emergency remote learning, rural schools, Tourism, tourism education, Teachers' perspectives	Alternation
Adigun (2022)	The Experiences of Emergency-Remote Teaching Via Zoom: The Case of Natural-Science Teachers Handling of Deaf/Hard-of-Hearing Learners in South Africa	Emergency remote teaching, coronavirus disease, learners who are deaf/hard of hearing, natural sciences, teachers' experiences, Zoom	International Journal of Learning, Teaching and Educational Research
Popescu (2021)	Students' Practical Skills Development in Online Education in Covid-19 Context	Online education, Practical skills, Learning process, Covid-19	International Journal of Education and Research
Elhaty, Elhadary, Gamil and Kilic (2020)	Teaching University Practical Courses Online during COVID-19 Crisis: A Challenge for E- Learning	COVID-19, practical classes, science, social science, virtual lab	Journal of Critical Reviews
Fewella (2023)	Impact of COVID-19 on distance learning practical design courses	COVID-19 pandemic, e-Learning, Art Education, Applied arts, Design education, Developing countries	International Journal of Technology and Design Education
Du Toit and Goosen (2024)	Consumer Studies Educators' Digital Technology Use	Consumer Studies education, digital Technologies,	Journal of Consumer Sciences

papers published between 2018 and 2023. Keywords guiding the selection process encompassed online teaching, challenges, practical subjects, and teacher perceptions. A thorough eligibility assessment ensured relevance and quality, while any disputes among authors regarding paper selection were resolved through discussion or third-party arbitration.

The study examines the challenges of the OTL of practical subjects, particularly teachers' experiences with it, and the review aimed to identify the challenges of adopting OTL methods in practical subjects. The research process began with 9,760 publications, but after removing duplicates, 6,876 papers remained. A deeper selection of titles and abstracts resulted in the 6641 publications being excluded. A total of 235 papers were subsequently subjected to full-text screening, and 208 articles that did not fit the inclusion criteria were reached to address challenges inherent to the South African secondary school environment. Consequently, 27 publications qualified for the systematic review. However, only 17 articles focused primarily on OTL challenges, practical aspects of the disciplines, and teachers' experience (Table 1). The quality of these selected studies was evaluated using the AMSTAR assessment tool, a widely respected method for appraising systematic reviews across various academic fields, thereby ensuring a thorough evaluation of the identified literature.

RESULTS AND DISCUSSIONS

To facilitate analysis, we identified and aggregated themes based on the most frequently mentioned topics in the published literature. The primary themes include OTL in practical subjects, the challenges associated with OTL, possible strategies for adopting OTL in practical subjects, and the perceptions of teachers and learners. These themes will be further elaborated upon in the subsequent section, with data supporting their relevance to the study.

Online teaching and learning in practical subjects

COVID-19 has made it necessary for educational institutions to switch to OTL using ICT (Khoza 2021). This health emergency shifted the educational ecosystem to such a degree that OTL became the principal teaching method (Mukuna & Aloka 2020). OTL enabled remote teaching and learning, replacing the traditional classroom (Chomunorwa & Mugobo 2023). Howeevr, disadvantaged schools lacking digital resources widened inequalities in South Africa (Maphalala *et al.* 2020; Chisango & Marongwe 2021). Additionally, OTL posed challenges for experiential subjects during lockdown (Elhaty *et al.* 2020). While OTL is still evolving concept, the pandemic accelerated its adoption as a prominent educational approach (Chomunorwa & Mugobo 2023; Adigun 2022). In the 21st century, access to digital technology is critical, as OTL supports transformative learning, adaptability, and other benefits such as ease of access, cost-effectivness, cognitive enhancement, self-paced learning, and global resources reach (Maphalala *et al.* 2022).

Although OTL offers numerous benefits for both teachers and learners, however, its successful implementation depends on various factors, including the characteristics of teachers and learners, school contexts, subject types, and community interaction (Monareng *et al.* 2020). Therefore, when introducing OTL into education training, it is essential to understand the specific needs and settings of both teachers and learners in advance . Elhaty *et al.* (2020) stress the value of practical subjects, which equip learners with fundamental theoretical knowledge and essential skills for further studies and the

workplace.. These subjects serve as a foundation, bridging the gap between theory and practice. Practical lessons provide critical hands-on experience, enhancing learners' skills and dispositions (Popescu 2021). Nevertheless, applying OTL effectively in practical subject areas can be challenging, particularly under extraordinary circumstances, as demonstrated during the COVID-19 pandemic. This underscores the need for strategic planning and adjustments to optmise OTL in such contexts.

OTL has various benefits for both faculty and learners. However, successful adoption depends on factors such as teacher and learner attributes, school conditions, areas of study, and local networks (Monareng *et al.* 2020). Before implementing OTL in educational settings, it is crucial to first understand the unique needs of both teachers and learners. Practical subjects are particularly significant, as they facilitate the acquisition of theoretical knowledge and critical skills, effectively bridging gap between theory and practice (Elhaty *et al.* 2020). Hands-on activities in practical classes improve learners' abilities and perspectives of a discipline (Popescu 2021). Nevertheless, difficulties may occur when OTL is applied to real-life subjects, particularly during outbreaks such as COVID-19. Hertrampf *et al.* (2022) observed that many institutions struggled to conduct practical lessons online amid social distancing and closures, notably in fields like CS, which rely on hands-on activities. Similarly, Makamure and Tsakeni (2020) observed that online teaching for practical subjects may be less effective than traditional methods, emphasising the necessity of adequate resources, clearly defined objectives, and robust administrative support. In the absence of these critical components, the integrating OTL into routine lessons can be exceedingly difficult.

Popescu (2021) highlighted that success in online practical teachers is influenced by a range of variables, including the tools at their disposal, the teaching environment, and the preparedness of the instructor. The success of OTL for practical courses depends on the right constellation of variables and suitable support for instructors. Although Fewella (2023) suggests that OTL can work with suitable hardware and incentive, it also emphasises the importance of providing teachers and learners with the necessary tools for effective online interactions. OTL promotes a learner-oriented approach and educates learners to think and apply for the Fourth Industrial Revolution by setting goals autonomously and obtaining resources by themselves (Skhephe & Mantlana 2021). Nevertheless, Makamure and Tsakeni (2020) caution that due to limited resources, the change in approach might unintentionally shift the balance towards a teacher-directed approach.

Challenges faced by practical subject teachers to implement online teaching and learning

Makamure and Tsakeni (2020) emphasise that the effectiveness of teaching with technology depends significantly on the type of technology used and how well it aligns with the curriculum. They stress that factors such as teaching methodology and learning design must be carefully considered when integrating technology into education. Transitioning to OTL, particularly in vocational subjects, presents significant challenges. Fewella (2023) highlights that many teachers lack training for online teaching and face issues such as the absence of immediate feedback, limited resources, and difficulties in assessing learners' comprehension. These challenges are exacerbated by the lack of adequate learning materials and poorly equipped laboratories. Chomunorwa and Mugobo (2023) point to the scarcity of skilled teachers experienced in virtual education, while Monareng *et al.* (2020) found that learners

often perceive online lessons as boring unless conducted in traditional, hands-on settings like kitchen labs in teaching CS. Makamure and Tsakeni (2020) further identify an engagement challenge, as some learners hesitate to participate actively due to a lack of formative assessments, which are more common in face-to-face interactions. Technical issues, such as download interruptions and connectivity problems, further hinder the effectiveness of OTL (Chisango & Marongwe 2021).

In the South African context, Dube (2020) underscores that the lack of stable ICT infrastructure, including internet access and computers, prevents consistent integration of OTL in schools. This creates a paradox where the potential for high-quality education and skills development through OTL is accompanied by difficulties in maintaining discipline and order in virtual environments, as noted by Adigun (2022). Dube (2020) highlights the critical need for teachers and learners to develop competency in computer use to facilitate effective online teaching. A lack of computer skills can act as a significant barrier, preventing both access to digital resources and the ability to capture and engage with content successfully. This underscores the importance of equipping educators and learners with the necessary digital skills to maximize the potential of OTL and ensure its effective implementation. Maphalala *et al.* (2022) also described the adverse mental and physical health impacts of online learning, such as visual problems and decreased physical activity, and they stress the need for frequent breaks.

Chisango and Marongwe (2021) state that ICT infrastructure theft and vandalism are important challenges to online learning. Furthermore, the digital divide in RSA demonstrates striking inequalities, as underprivileged schools have insufficient access to key resources and facilities, whereas the same is not true in urban schools that have access to all facilities such as computers, internet, and software. Additionally, financial constraints pose significant challenges to the implementation and adoption of OTL. Many schools are insufficiently funded, and families of learners often face financial difficulties. As a result, it becomes challenging for both teachers and learners to access current hardware and software, which are often expensive. This financial strain leads to shared devices among family members, reducing the efficiency of OTL. Moreover, the lack of financial support prevents access to high-technology solutions, such as interactive learning platforms. Consequently, teachers and learners are forced to rely on low-technology alternatives, such as SMS-based communication and printed materials, which limit the full potential of OTL (Swartz *et al.* 2018; Hendricks & Fraser 2020; Hollow & Van Dijk 2020).

Possible strategies for adopting online teaching and learning in Consumer Studies as a subject

Residential practical lessons for OTL present significant challenges but also have the potential to drive innovative solutions. Chomunorwa and Mugobo (2023) emphasize the importance of understanding the specific needs of teachers and learners to facilitate technology acceptance effectively. Additionally, curriculum planners should tailor their strategies for implementing OTL in practical subjects like CS based on the unique requirements of the subject area, the desired learning outcomes, and the characteristics of both staff and learners (Elhaty *et al.* 2020). This approach ensures that OTL aligns with educational goals and addresses the practical constraints associated with teaching hands-on subjects. A hybrid approach is increasingly recognized as an effective method for addressing the challenges of OTL in practical subjects like CS. This model integrates OTL with hands-on or in-person practical sessions,

enabling a balance between theoretical and skill-based learning. For instance, theoretical concepts, such as nutrition principles or textile science, can be efficiently taught through digital platforms, while in-person sessions focus on developing practical skills like food preparation and garment construction (Fleischmann 2020). This approach aligns with the blended learning lab rotation model described by Fewella (2023), which combines traditional teaching methods with computer lab-based activities, including subject-specific gamification. Moreover, digital tools, such as cameras to record demonstrations, can enhance understanding by allowing learners to revisit processes outside the classroom. This practice, as highlighted by Dube-Xaba (2022) and Du Toit and Goosen (2024), extends learning opportunities beyond the standard approaches, thereby addressing gaps in both theoretical and practical education.

Digital devices like tablets and laptops enable gamification in classes, with interactive games tailored to CS themes. Online lessons using applications such as Zoom or MS Teams help specialists deliver their skills remotely, and recorded sessions can be used to prepare for exams (Skhephe 2022). Tools such as Mentimeter, AnswerGarden, and Padlet offer innovative ways to conduct informal assessments while fostering student engagement and collaboration. These platforms not only encourage participation but also make learning enjoyable, promoting the development of essential 21st-century skills (Du Toit & Goosen 2024). Additionally, Learning Management Systems (LMS) serve as centralized hubs for managing resources, assessments, and communication, streamlining processes for teachers and learners. By increasing access to educational materials and saving time, LMS platforms enhance the overall learning experience (Monareng *et al.* 2020). Accessible custom gadgets with zero-rated internet access points can overcome access barriers (Chomunorwa & Mugobo 2023). Applications containing communication (such as instant messaging apps and WhatsApp) provide effective communication for disseminating teaching material and assessment, allowing learners to ask questions freely.

Teacher's perspective towards the adoption of online teaching and learning

Exploring learner teachers' perceptions of OTL is essential to a successful implementation. Chomunorwa and Mugobo (2023) characterise secondary school teachers' scepticism about the effectiveness of OTL. Elhaty *et al.* (2020) point out that some teachers find OTL unsuitable for some areas of the curriculum because it can be based on object interaction being too manual to be practical and are concerned about the potential increase in stress and anxiety. Issues with the potential for loss of classroom control and employment stability as a result of technology, as pointed out by Maphalala *et al.* (2022), further fuel this skepticism. Chisango and Marongwe (2021) emphasis the issue of technophobia among teachers, stemming from a lack skills and resources for effective technology integration. Despite undergoing training, many teachers still feel unprepared, highlighting the critical need for ongoing professional development in digital literacy (Makamure & Tsakeni 2020). Additionally, limited resources, including high data costs and restricted ICT access, further hinder the adoption of OTL (Dube 2020; Chisango & Marongwe 2021). Mukuna and Aloka (2020) point out the disparities between urban and rural schools, with urban schools often receiving preferential treatment, exacerbating existing inequalities. However, addressing these challenges through investment in teacher training and infrastructure can significantly enhance OTL's effectiveness. Ensuring teachers and learners possess essential digital skills and implementing a

learner-focused approach can also foster better engagement and maximize the benefits of OTL.

CONCLUSIONS

Implementing OTL in CS presents distinct challenges due to its practical nature, which is intrinsically linked to the activities of teachers, learners, and the subject matter. While OTL offers numerous advantages, such as flexibility, accessibility, and innovative learning methods, its success depends on meticulous planning, sufficient resources, and addressing the specific needs of stakeholders. Without these considerations, the integration of OTL into CS may fail to bridge the gap between theoretical instruction and practical application, ultimately limiting its effectiveness. . Nevertheless, CS teachers often find it challenging to provide effective learning in the online environment, and learners can sometimes fail to understand applicational knowledge without practice. Moreover, insufficient online infrastructure makes OTL implementation in classrooms more challenging. To address these problems, the government should increase internet accessibility and infrastructure, which may involve improving existing technology or creating new ones. School community and stakeholder support is critical to the effectiveness of OTL programs. The UTAUT framework provides a tool through which teachers and administrators can be equipped with the means to devise successful approaches to OTL, in and amongst the practice subjects. Appropriate investment and support allow OTL to contribute greatly to pedagogy and learning in CS.

Recommendations

The Department of Basic Education (DBE) is advised to enhance ICT infrastructure in schools to ensure reliable and continuous internet access for online teachings. Protective measures for digital assets should be implemented to address security-related risks. Ongoing professional development for teachers in the use of technology in education is essential, especially given the challenges highlighted during the COVID-19 pandemic. Providing learners with suitable ICT tools, such as tablets and computers, along with affordable data solutions, is critical for their effective participation in online learning.

Community awareness campaigns can emphasize the benefits of integrating ICT in schools, fostering support for online education activities. Shifting to online teaching will help educational institutions adapt to challenges like national lockdowns. Community ownership of schools is also vital to minimize theft and vandalism of digital resources. Moreover, designing an appropriate digital environment tailored to the needs of underprivileged schools, with active involvement from stakeholders in the planning and implementation of OTL, is key to achieving sustainable success.

Implications for policy and practice

This study highlights the importance of effectively preparing CS teachers to adopt OTL. Deeply structured training from the basics is essential, including online pedagogy modules to train teachers in the skills they need. Equally, familiarising teachers early in their education with these techniques will avoid resistance and skill gaps. Continuous professional development courses are paramount to increase teachers' comfort and competency in digital teaching. Success depends on the participation of all stakeholders, continuous support, and facilities. In addition, having teachers involved in the planning and implementation of the methods leads to their expertise and experience being truly valuable and considered, thus leading to a culture of

acceptance and flexibility in using new approaches in education.

Limitations and direction for future studies

The present study focused on aspects of practical subjects, more specifically CS. However, there is scope for more research across the spectrum of practical subjects to better understand the challenges and opportunities in OTL. The study only reviewed journal articles, and it is suggested that for future research, conference papers, case studies, and reports can be reviewed for a comprehensive perspective. Furthermore, investigating current and future OTL trends is important due to the constantly changing education system. Post-pandemic research has the potential to give insights into the nature of the long-term impact of the move to online learning and lead to theory-driven, evidence-based, informed, effective digital pedagogical strategies.

AUTHORS CONTRIBUTION

All authors participated in the planning and design of the paper. All authors substantially contributed and approved the final version to be submitted.

DECLARATION

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

The authors would like to thank Durban University of Technology for their contribution of resources and everyone who contributed to this study.

REFERENCES

Adigun, O. T., 2022, 'The Experiences of Emergency-Remote Teaching Via Zoom: The Case of Natural-Science Teachers Handling of Deaf/Hard-of-Hearing Learners in South Africa', *International Journal of Learning, Teaching and Educational Research*, 21(2), 176-194.

Albrahim, F. A., 2020, 'Online Teaching Skills and Competencies*', The Turkish Online Journal of Educational Technology,* 19 (1), 9-20.

Allen, I. E. & Seaman, J., 2013, '*Changing course: Ten years of tracking online education in the United States*', Babson Survey Research Group and Quahog Research Group, LLC.

Aytekin, A., Özköse, H. & Ayaz, A., 2022, 'Unified theory of acceptance and use of technology (UTAUT) in mobile learning adoption: Systematic literature review and bibliometric analysis', *COLLNET Journal of Scientometrics and Information Management*, 16 (1), 75-116.

Basar, Z. M., Mansor, A. M., Jamaludin, K. A. & Alias, B. S., 2021, 'The Effectiveness and Challenges of Online Learning for Secondary School Students – A Case Study'*, Asian Journal of University Education*, 17 (3), 119 – 129.

Baticulon, R. E., Sy, J. J., Alberto, N. R., Baron, M. B. C., Mabulay, R. E. C., Rizada, L. G. T., & Reyes, J. C. B., 2021, 'Barriers to online learning in the time of COVID-19: A national survey of medical students in the Philippines', *Medical Science Teacher*, 31(2), 1-10.

Booyse, C., Du Rand, G., & Du Toit, A., 2013, 'The standing of the curriculum for Consumer Studies as school subject in the South African context', *Journal of Family Ecology and Consumer Sciences*, 41, 85-94.

Chigora, P., Poshai, L. & Mcilo, A., 2022, 'Challenges with online teaching and learning under COVID-19 lockdown in selected Zimbabwean universities', *Journal of Public*

Administration and Development Alternatives, 7 (2), 46-49.

Chisango, G. & Marongwe, N., 2021, 'The digital divide at three disadvantaged secondary schools in Gauteng, South Africa', *Journal of Education*, (82),149 -165.

Chomunorwa, S., & Mugobo, V. V., 2023, 'Challenges of e-learning adoption in South African public schools: Learners' perspectives', *Journal of Education and E-Learning Research*, 10(1), 80–85.

Dhawan, S., 2020, 'Online Learning: A Panacea in the Time of COVID-19 Crisis', *Journal of Educational Technology Systems*, 49, 5-22.

Du Toit, A., 2019, 'The potential of the South African consumer studies curriculum to foster indigenous knowledge', *Journal of Consumer Sciences*, 47, 28-39.

Du Toit, A., 2021, 'Harnessing education through entrepreneurship in consumer studies to address youth unemployment in South Africa', *Journal of Consumer Sciences*, 49, 1-14.

Du Toit, A. & Goosen, L., 2024, 'Consumer studies educators' digital technology use: A case in North West, South Africa', *Journal of Consumer Sciences*, 52, 1-12.

Dube, B., 2020, 'Rural Online Learning in the Context of COVID-19 in South Africa: Evoking an Inclusive Education Approach', *Multidisciplinary Journal of Educational Research*, 10(2), 135-157.

Dube-Xaba, Z. 2022, 'Emergency Remote Teaching and Learning of Tourism during COVID-19 in Rural Secondary Schools', *Alternation*, 29 (1), 268-292.

Elhaty, I. A., Elhadary, T., Gamil, R.E. & Kilic, H., 2020, 'Teaching university practical courses online during COVID-19 crisis: a challenge for e-learning', *Journal of Critical Review*, 7(8), 2865-2873.

Erjavsek, M., 2021, 'Modern aspects of home economics education and Slovenia', *C E P S Journal*, 11(4), 33-62.

Fewella, L., 2023, 'Impact of COVID-19 on distance learning practical design courses. *International Journal of Technology and Design Education*, 33 (1), 1703 -1726.

Fleischmann, K. 2020, 'Online design education: Searching for a middle ground', *Arts and Humanities in Higher Education,* 19 (1), 36-57.

Galhotra, B., Seth, S. & Lowe, D., 2023, 'Assessing the Practicality of Practical Courses in Online Education', *International Journal of Advanced Research in Science Communication and Technology*, 3 (2), 197-204.

Geraghty, A., 2021, 'Home economics and food literacy: An investigation into the factors influencing the effective delivery of food literacy curricula in Irish Post Primary Schools as perceived by key stakeholders', Master's dissertation, Technological University Dublin, Dublin, Ireland.

Haleem, A., Javaid, M., Qadri, M. A. & Suman, R., 2022, 'Understanding the role of digital technologies in education: A review', *Sustainable Operations and Computers*, 3, 275-285.

Haron, H. N., Masrom, M., Ya'acob, S., & Sabri, S. A. 2021. The challenges and constraints of online teaching and learning in the new normal environment. *International Journal of Academic Research in Business and Social Sciences,* 11(4): 1284-1295.

Harrison, E. & McTavish, M., 2018, 'Babies: Infants' and Toddlers' Emergent Language and Literacy in a Digital Culture of devices', *Journal of Early Childhood Literacy,* 18, 163-188.

Hasifah, B. A. A., 2020., 'Keberkesanan Pembelajaran Menggunakan Forum Dalam Sistem ELearning: Kajian Kes Pelajar Tahun 4spi', Joho, Penerbit Universiti Teknologi Malaysia. ('Effectiveness of learning through the use of E-learning system: 4th year student case study', BEd, Malaysia University of Technology.)

Hazwani, M. N., Noor R. A. B. & Norziah O., 2017, 'e-Learning Among Students of Higher Education Institutions in Selangor', *Malaysian Online Journal of Education,* 1(1),74- 82.

Hendricks, M., & Fraser, W. 2020, 'Bridging the digital divide in South African education: Realities, challenges, and solutions', *Education and Information Technologies,* 25 (6), 5593-5610.

Hertrampf, K., Wenz, H. J., Kaduszkiewicz, H. & Goetz, K. 2022, 'Suspension of face-to-face teaching and ad hoc transition to digital learning under Covid-19 conditions – a qualitative study among dental students and lecturers', *BMC Medical Education,* 22 (257), 1 -10.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A., 2020, 'The difference between emergency remote teaching and online learning', *Educause Review*, 27.

Hollow, D., & Van Dijk, J. 2020, 'The first-level digital divide shifts from inequality to skills, *Journal of Information, Communication and Ethics in Society,* 18(2), 252-266.

Hussin, N., 2017, 'Penggunaan Laman Web Sebagai Transformasi dalam Pengajaran dan Pembelajaran Pendidikan Islam' ('Site usage of web transformation in teaching Islamic education', *Journal of Islamic Education*, 1 (2),58 – 73.

Ismael, H. H. A. 2021, 'Exploring the Critical Challenges that Influencing Online Learning During the Covid-19 Pandemic: A Case of Public Universities in the Kurdistan Region/ Iraq', Masters. KDI School of Public Policy and Management, Iraq.

Jackson, T. 2014, *Sustainable consumption*, Earthscan.

Ja'ashan, M.M.N. H., 2020, 'The Challenges and prospects of using E-learning among EFL students in Bisha University', *Arab World English Journal*, 11 (1), 124-137.

Kentnor, H. E., 2015, 'Distance Education and the Evolution of Online Learning in the United States', *Curriculum and Teaching Dialogue,* 17 (2), 21-34.

Khoza, S. D. 2021, 'The Burden on Online Teaching and Learning in South African Secondary Schools: An Attempt to Respond to a New Normal', *Journal of Educational Studies*, 20 (2),109- 121.

Kotoua, S., Ilkan, M. & Kilic, H., 2015, 'The Growing of Online Education in Sub Saharan Africa: Case Study Ghana', *Procedia - Social and Behavioral Sciences*, 191, 2406-2411.

Kumi-Yebaoh, A., Sallar, A., Kiramba, L. & Kim, Y., 2020, 'Exploring the Use of Digital Technologies from the Perspective of Diverse Learners in Online Learning Environments', *Online Learning*, 24(4), 42-63.

Kuswardinah, A., Setyaningsih, D. N. & Nurmasitah, S., 2021, 'Home economics education: a subject for moral and character building in Junior High school students in Indonesia', *International Journal of Innovation, Creativity and Change*, 11(10), 219- 237.

Letseka, M., Letseka, M. M. & Pitsoe, V., 2018, 'The Challenges of E-learning in South Africa', *Trends in E-learning, 8*, pp. 121-138.

Makamure, C. & Tsakeni, M., 2020, 'COVID-19 as an Agent of Change in Teaching And Learning Stem Subjects', *Journal of Baltic Science Education*, 19 (6A), 1078 – 1091.

Mansor, A. N., Zabarani, N. H., Jamaludin, K. A., Mohd Nor, M. Y., Alias, B. S. & Mansor, A. Z., 2021, 'Home-Based Learning (HBL) Teacher Readiness Scale: Instrument Development and Demographic Analysis', *Sustainability*, 13(4), 22-28.

Maphalala, M. C., Mncube, D. W. & Mkhasibe, R. G. 2022, 'South African Secondary School Discussions on Digital Learning and Pandemic Preparedness', *International Journal of Higher Education*, 11(6), 18 – 27.

Margaret, R. E., Uma, B., Tejonidhi, M. R. & Neelakantappa, B. B., 2018, 'A Recipe for the Use of ICT Tools in an Educational Institute', *Journal of Engineering Education Transformations,* 31(3),114 – 119.

Marikyan, D. & Papagiannidis, S., 2023, 'Unified Theory of Acceptance and Use of Technology: A review', In Papagiannidis, S. (Ed), TheoryHub Book, viewed 21 November 2023, from https://open.ncl.ac.uk/ ISBN:9781739604400

Monareng, J., Ramraj, A. B. & Mashau, P., 2021, 'The rise in online learning in South African schools due to the coronavirus

pandemic', *African Journals Online,* 18 (4), 16744–16752.

Mukuna, K. R. & Aloka, P. J. O. 2020, 'Exploring Teachers' Challenges of Online Learning in Covid-19 at a Rural School, South Africa', *International Journal of Learning, Teaching and Educational Research*, 19 (10), 134-149.

Nasson, L., 2020, 'Stop thinking about tomorrow: Even in the era of COVID-19 History is teaching past and present Reflections on teaching History during COVID -19', *YesterdayandToday*, (24), 219 – 225.

Ngesi, N., Landa, N., Madikiza, N., Cekiso, M. P., Tshotso, B. & Walters, L. M., 2018, 'Use of mobile phones as supplementary teaching and learning tools to learners in South Africa', *Reading and Writing*, 9 (1), viewed 10 October 2022, from https://rw.org.za/index.php/rw/article/view/190/461

Ngwenya, J. C. & Shange, N. L., 2019, 'Learners' views on challenges encountered during practical work in Consumer Studies: A case of one school in KwaZulu-Natal', *African Journal of Hospitality, Tourism and Leisure,* 8 (1), 1 – 13.

Nwokeocha, S., 2021, 'Impact of Covid-19 on Teaching and Learning in Africa Assessed by the Education Unions', *Journal of Education and Learning*, 10 (4), 15 – 26.

Oliveira, A., Feyzi Behnagh, R., Ni, L., Mohsinah, A. A., Burgess, K. J. & Guo, L., 2019, 'Emerging technologies as pedagogical tools for teaching and learning science: *A literature review', Hum Behavior and Emerging Technology,* 1(2), 149–160.

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R. & Sindhi, S., 2018, 'Online Education: Worldwide Status, Challenges, Trends, and Implications', *Journal of Global Information Technology Management,* 21 (4), 233-241.

Pavithra, A., 2018, 'Multimedia and its applications', 10, 271-276, viewed 04 September 2022, from https://www.researchgate.net/publication/329417059_MULTIMEDIA_AND_ITS_APPLICATIONS

Pendergast, D., 2021, 'The role of home economics education in the 21st century: the Covid-19 pandemic as a disruptor, accelerator, and future shaper', *C E P S Journal*, 11(4), 13-32.

Popescu, E. F. 2021, 'Students' Practical Skills Development in Online Education in Covid-19 Context', *International Journal of Education and Research*, 9 (4), 21- 34.

Raheim, M. D. H., 2020, 'Indonesian University Students' Likes and Dislikes about Emergency Remote Learning during the COVID-19 Pandemic', *Asian Journal of University Education*, 17(1), 1-18.

Ratheeswari, K., 2018, 'Information Communication Technology in Education', *Journal of Applied and Advanced Research*, 3 (45), S45-S47

Sadiku, M. N. O., Adebo,P. O. & Musa, S. M., 2018, 'Online Teaching and Learning,' *International Journals of Advanced Research in Computer Science and Software Engineering,* 8 (2), 73 – 75.

Samat, M. F., Awang, N. A., Hussin, S. N. A. & Nawi, F. A. M., 2020, 'Online Distance Learning Amidst Covid-19 Pandemic Among University Students: A Practicality of Partial Least Squares Structural Equation Modelling Approach', *Asian Journal of University Education*, 16(3), 220-233.

Seaman, J. E., Allen, I. E. & Seaman, J., 2018, 'Grade increase tracking distance education in the United States', viewed 26 October 2022, from https://eric.ed.gov/?id=ED580852

Sethosa, M. M., 2021, 'Teachers' perceptions on ICT integration in the classroom: a case study of secondary schools in the Potgietersrus circuit, Limpopo province', MEd, University of South Africa.

Skhephe, M. 2022, 'The Virtual Classroom: Challenges of COVID-19 Pandemic in Accounting Subject Classrooms in the Eastern Cape Province, South Africa', *African Perspectives of Research in Teaching & Learning*, 6 (2), 112 – 124.

Skhephe, M. & Mantlana, C. 2021, 'Accounting teachers' voices on factors affecting online teaching during the 4th Industrial Revolution in the face of COVID-19 in selected high schools in the Eastern Cape, South Africa', *Research in Social Sciences and Technology*, 6(3), 109-121.

Sodhar, I. N., Jalbani, A. H., Buller, A.H., & Sodhar, A. N., 2020, 'Tools Used in Online Teaching and Learning through Lock-Down', *International Journal of Computer Engineering in Research Trends,* 7 (8), 36 – 40.

Sodhar, I.N., Mirani, A. & Brohi, A.J., 2019, 'Information Communication and Technology Tools Integration in Higher Education', *International Journal of Progressive Sciences and Technologies*, 15 (1), 127-133.

Svatos, J., Holub, J., Fischer, L. & Sobotka, J. 2022, 'Online teaching of practical classes under the Covid-19 restrictions', *Measurement: Sensors*, 22: 1-9, viewed 20 December 2022, from https://doi.org/10.1016/j.measen.2022.100378

Swart, A. J. 2021, 'Exploring the digital divide: The effect of the Covid-19 lockdown on South African education,' *International Journal of Information and Education Technology,* 11(5), 220-226.

Tesar, M. 2020, 'Towards a Post-Covid-19 'New Normality?': Physical and Social Distancing, the Move to Online and Higher Education', *Policy Futures in Education*, 18(5), 556-559.

Thoresen, V. W. 2017, *Responsible living: Concepts, education, and future perspectives*, Springer.

Torun, M. 2023. 'Bibliometric Analysis and Visualization of Research in the Field of Green Economy (1993-2023)', *Journal of Economic Policy Researches, Istanbul University, Faculty of Economics*, 10(2), 587-603.

Vandeyar, T., 2015, 'Policy intermediaries and the reform of e-education in South Africa', *British Journal of Educational Technology,* 46 (2), 344-359.

Van Nunen, K., Li, J., Reniers, G. & Ponnet,K. 2018, 'Bibliometric analysis of safety culture research', *Safety Science*, 108, 248-258.

Venkatesh, V., Morris, M., Davis, G. & Davis, F., 2003, 'User Acceptance of Information Technology: Toward A Unified View', *MIS Quarterly*, 27 (3), 425 – 478.

Venkatesh, V., Thong, J. Y. L., & Xu, X. 2012, 'Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology', *MIS Quarterly,* 36(1), 157-178.

Williams, M. D., Rana, N. P., & Dwivedi, Y. K. 2015. 'The unified theory of acceptance and use of technology (UTAUT): A literature review', *Journal of Enterprise Information Management,* 28(3), 443 - 488.

Zalat, M. M., Hamed, M. S. & Bolbol, S.A., 2021, 'The experiences, challenges, and acceptance of e-learning as a tool for teaching during the COVID-19 pandemic among university medical staff', *PLoS ONE*, 16(3), 1-12.