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Perceived Impact of Digital Pedagogical Training on Technology Integration Among Preservice Teachers

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Abstract

Digital pedagogy is a crucial aspect of teacher education aimed at equipping preservice teachers with the necessary skills and knowledge for integrating technology into their teaching. Previous studies have shown that digital skills are key in preparing preservice teachers to be capable of dealing with technology for effective teaching solutions. Consequently, many teacher education programs lack comprehensive training in digital pedagogy, leading to ineffective technology integration. To date, little has been done regarding the impact of limited digital pedagogy training on technology integration among preservice teachers. This study examined how insufficient digital pedagogy training affects preservice teachers' ability to integrate technology into their teaching practices in Lesotho. Following Transformative Learning Theory, the study adopted a qualitative research design grounded in interpretivism. 15 preservice teachers were purposively selected as the sample for the study for researcher's convenience and data were analyzed using thematic analysis. The following challenges were identified as resulting from limited pedagogical training: limited integration of technology, low confidence and digital competence, fear of failure and insufficient training in digital pedagogy. Without adequate training, preservice teachers' ability to effectively incorporate technology into their teaching practices will always be compromised.

Keywords: *Inadequate Training, Strategies, Traditional Teaching, Teacher Education, Digital Tools.*

Introduction

Digital pedagogy has become a vital part of today's world as it moves toward digitalization in all fields of technology (Chisango & Marongwe, 2018; Chere-Masopha 2018). Literature shows that it is a crucial aspect of teacher education aimed at equipping preservice teachers with the necessary skills and knowledge for integrating technology into their teaching Khumalo & Du Plessis 2024; Jita, 2016). Previous studies have shown that digital skills are key in preparing preservice teachers to be capable of dealing with technology for effective solutions Chere-Masopha, 2018; Jita, 2016). This implies that acquiring mere information and communication technology (ICT) skills is not sufficient but using it to improve teaching and learning is key for pedagogy-technology integration. Furthermore, for them to be able to integrate technology in their teaching, there is a need for preservice teachers to have pedagogical competence in the use of technology since change does not occur instantaneously. Digital pedagogy represents e-learning platforms that facilitate collaborative and interactive teaching and learning among preservice teachers without constraints on time and place (Wang et al; 2022). This implies that it gives preservice teachers the opportunity to learn on their own time and place as they can easily access material and use it for their learning. This serves as motivation for both lecturers

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and preservice teachers as it saves them time and physical energy of preparing for and presenting lesson (Wang et al 2022). Consequently, many teacher education programmes lack comprehensive training in digital pedagogy for preservice teachers, leading to challenges in effective technology integration in classrooms.

Literature shows that a lack of digital pedagogical skills hinders preservice teachers from integrating technology into their classrooms (Chere-Masopha, 2028; Wang et al, 2022). That is, they use technology only for convenience rather than for pedagogical effectiveness. For example, they may use technology such as PowerPoint to present their lessons but use it simply for the sake of using it and do not evaluate what may be best for the students. Lecturers could save time and costs by uploading assignments and assessing them online consequently, they seem not doing it because of lack of technological skills (Nanjundaswamy et al., 2021). The unavailability of some technology tools also leads to lecturers resorting to face-to-face, orally-mediated chalkboard pedagogies, which results in preservice teachers struggling with technology integration when they get to teaching practice because they were never given hands-on experience during training. To date, little has been done in terms of the impact of limited digital pedagogy on technology integration among preservice teachers. This study examines how limited digital pedagogy training impacts preservice teachers' ability to integrate technology into their teaching practices in Lesotho, focusing on the challenges that impede integration and strategies for integration. If preservice teachers do not receive adequate training in digital pedagogy, their ability to effectively incorporate technology into their teaching practices is compromised.

Research Questions

The following questions guided this research:

a) What is the impact of limited training on preservice teachers' digital pedagogies?

b) What strategies should teacher education adopt to improve training offered to preservice teachers?

Literature Review

Digital pedagogy refers to the use of digital technologies to enhance teaching and learning processes (Marais, 2023). It is a crucial aspect of teacher education that aims at equipping preservice teachers with the necessary skills and knowledge that will help them integrate technology into teaching and learning. This means that digital pedagogy is not just about using technology but also about understanding how digital tools transform pedagogical practices (Singh, 2013). Digital competencies can be defined as skills and capabilities that utilize digital technologies, such as ICT skills, technology skills, information literacy, digital literacy, and digital skills (Marais, 2023). These competencies are crucial for technological integration. This implies that preservice teachers should not merely possess these skills but also rather be able to utilize them to improve teaching and learning as it is key for pedagogy-technology integration.

As studies emphasize the importance of technological competence in shaping education, all preservice teachers must be well-trained for this purpose (Buabeng, 2012). Additionally, Chere-Masopha, (2018); Van Dijk, 2020) argue that there are sometimes internal and external factors that form a complex web inhibiting integration due to misinterpretations and contradictions about technology and preservice teachers' practices regarding it. This continues to pose new challenges for preservice teachers, causing resistance among them to integrate technology into

teaching and learning.

It is argued that digital competencies are influenced by the society in which preservice teachers grew up and the access they have to resources in teacher education, which are translated to the digital divide (Marais, 2023). The digital divide refers to unequal access to digital tools, Internet connectivity, and technological infrastructure across different geographic and socio-economic contexts (Van Dijk, 2020); Moonasamy and Naido 2022). These barriers are evident around the globe and are considered to be one of the biggest causes of unequal societies in the world that influence the lack of digital competence among preservice teachers (Liu et al, 2023; Smith, 2019). In many training institutions, limited access, up-to-date digital resources, and insufficient institutional support are reported restricting the scope and quality of technological training for preservice teachers. Some of the preservice teachers cannot access the Internet at home, so using the Internet remains a challenge for them (Orlando and Attard, 2019). The result is that they use it for recreational activities rather than educational purposes, even though preservice teachers are technological elites. This lack of exposure directly influences the formation of preservice teachers' digital pedagogical beliefs, shaping how they perceive the usefulness, feasibility, and relevance of technology in education. This phenomenon not only limits their potential for innovative teaching but also exacerbates the existing digital divide between traditional and modern educational practices (Smith, 2019). It also means that the digital divide does not merely limit access but actively contributes to shaping preservice teachers' beliefs, attitudes, and practices in relation to digital pedagogy.

Inadequate training often leads to preservice teachers lacking the necessary skills and knowledge to effectively use technology in teaching. Dagdilelis (2018) agrees that the successful integration of technology depends on skilled preservice teachers, not only the availability of resources or the existence of physical and technological infrastructure. Lack of training contributes to limited or incompetence in digital pedagogy. Olatokum and Ntemana (2015) confirms that lack of training affects preservice teachers' attitudes, abilities, and desires to integrate information technology into the classroom. Consequently, many preservice teachers replicate the traditional methods they experienced during training and further entrench these conventional pedagogical approaches when they are on teaching practice. Jita (2016) suggests that since technology is important for improving teaching and learning, it needs to be integrated into all modules so that the preservice teachers can become familiar with it. She further points out that there should be guidelines on how preservice teachers should integrate technology into their teaching so that they do not struggle with it. It is also argued that training programs that do not explicitly teach digital pedagogy leave preservice teachers ill-prepared to design or implement technology-integrated lessons. Sometimes, these preservice teachers are placed in schools with limited facilities, or with mentors who do not allow them to use technology in the teaching and learning process (Jita, (2016) and Tondeur et al (2017). Moreover, Kurata et al., (2024) and Lekhetho, (2021) also pointed out that training must be continuous to maintain any degree of proficiency. This is why adequate training is crucial to improve digital pedagogical competence. Without structured digital pedagogy training, preservice teachers develop minimal digital competence.

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Teaching with technology is not a "one size fits all" approach; it depends on the type of technology in use at the time and the curriculum to be taught (Lekhetho, 2021). It is fundamentally about mindset transformation, cultivating an openness to change, a commitment to lifelong learning, and a belief in the potential of technology to enhance educational equity and engagement. That means that technology should not be incorporated into education for the sake of the institution but rather for the quality of education. According to Molise and Dube (2020), the training programs that emphasize theoretical knowledge limit preservice teachers' engagement with digital tools. It also affects their self-efficacy in technology integration and encourages them to use technology for fun-related activities and not for meaningful learning. Limited digital training reinforces reliance on rote learning and teacher-centered approaches. According to Van Dijk, (2013) and Buabeng (2012), in African contexts where access to technology is already constrained, the absence of robust digital training further entrenches conservative teaching approaches. Hence, preservice teachers in Lesotho thus enter the profession with a minimal understanding of how technology can support student-centered learning (Lekhetho, 2021). According to Kalanda and De Villiers (2013), training programs emphasize theoretical knowledge, with limited engagement with digital tools. This disconnects the expectations of digital competency in schools from the preparation preservice teachers receive in colleges and universities.

Limited digital pedagogy training further results in preservice teachers having insufficient exposure to basic and advanced technology tools. According to Wami and Kobani (2021), computers are only installed in the technology laboratories. This makes integration slow because of poor planning and hence technology does not become an integral part of instruction. A study by Bhattacharjee and Deb (2016) in South Africa found that many preservice teachers lacked the confidence to use technology in the classroom because their training focused on theory rather than practice. Similarly, Chigona et al (2014) report that teacher education programs rarely include hands-on training with technologies such as interactive whiteboards, learning management systems, or online collaboration tools. Furthermore, preservice teachers can undoubtedly engage in technological learning because they are accustomed to using electronic gadgets. Integrating technology into the classroom can therefore arouse their interest and get them more engaged in the teaching and learning process, providing them with experiences that allow them to remain interested in their subjects without distraction. Wami and Kobani (2021)

also add that since it helps the teaching and learning process and makes it effective and efficient, it should be offered as a compulsory course for preservice teachers. The challenge is that teacher training does not enable teachers of the future to explore and exploit the learning potential connected to technology and to equip them to facilitate the learning process by developing creativity in their use of technology in relation to the subjects they teach.

Many institutions lack the necessary technological infrastructure, such as computers and reliable Internet access, thereby hindering the use of technology in classrooms. Sometimes, there is limited or a lack of resources in schools to which preservice teachers are assigned, and this inhibits them from integrating technology (Jita, 2016). This encourages them to use mobile technology devices only meant for enhancing knowledge and not for actual teaching. Besides resources or facilities, preservice teachers may be assigned to mentors who never use technology in their teaching and cannot help these preservice teachers to use these tools because they are not competent (Jita, 2016). As a result, when their mentors are not able to use technological tools, preservice teachers end up having no opportunities to observe and engage with effective models of technological integration. This limited exposure contributes to a lack of practical skills, undermines their confidence in using digital tools, and leaves them ill-prepared to meet the demands of contemporary, technology-rich learning environments.

Since modern societies demand preservice teachers to be more knowledgeable and skilled in using technology in teaching and learning, competent lecturers are needed who use technology to make the teaching and learning process easy and interesting (Bhattacharjee & Deb, 2016)

. Therefore, it is important that during training, preservice teachers must be introduced to how to use technology for them to acquire the necessary skills and knowledge in using technology. Wami and Kobani (2017) also add that since technology helps in the teaching and learning process and makes it effective and efficient, it should be offered as a compulsory course so that preservice teachers do not use technology for convenience but rather for pedagogical effectiveness. The challenge is that teacher training does not enable teachers of the future to explore and exploit the learning potential connected to technology and to equip them to facilitate the learning process by developing creativity in their use of technology for the subjects they teach (Singh, 2013). This can undoubtedly engage preservice teachers in technological learning because they are accustomed to using electronic devices, so integrating technology into the classroom can arouse their interest and get them engaged in the teaching and learning process. This will provide them with experiences that will allow them to remain interested in their subjects without distraction.

Theoretical Framework: Transformative Learning Theory

The study is rooted in Transformative Learning Theory (TLT), founded by Mezirow (1978). Transformative Learning Theory provides a robust framework for understanding the complex processes by which preservice teachers adopt and integrate digital pedagogy. At its core, TLT posits that adult learners undergo meaningful learning when they experience a transformation in their frames of reference, those deep-rooted assumptions and beliefs that shape how they interpret and respond to the world. This transformation is often initiated by a disorienting dilemma, a situation or experience that challenges adult learners' previously held beliefs, prompting critical reflection and ultimately leading to a shift in perspective (Mezirow,1978).

This theory is relevant to the current study in that digital pedagogy frequently serves as this disorienting dilemma in the context of teacher education. Many preservice teachers enter teacher

training with limited exposure to technology-rich learning environments, and often perceive teaching as a traditional, teacher-centred activity. The introduction of digital tools, such as learning management systems, digital assessment platforms, and communication tools, requires them to reassess not only how they teach but also what it means to be an effective preservice teacher in the 21st century. Thus, TLT offers a valuable lens for examining how preservice teachers in Lesotho navigate the evolving landscape of digital education. It helps to explain not only how preservice teachers acquire knowledge and skills but also how their deep-seated beliefs and professional identities have reshaped their digital pedagogical realities. As preservice teachers are confronted with the challenges of integrating unfamiliar digital tools into their pedagogical practices, they engage in self-examination and critical reflection on their previous beliefs about teaching and learning. Through reflective journaling, peer discussions, and supervised teaching practicums, these individuals can begin to explore new strategies and teaching identities that are more learner-centred, inclusive, and responsive to the demands of digital education

Research Methodology

This study adopted a qualitative research design grounded in interpretivism to explore and understand the subjective experiences and perceptions of preservice teachers regarding the integration of technology into their teaching practices (Creswell and Poth, 2018). A phenomenological approach was used to gain insights into how preservice teachers experience and interpret the impact of limited digital pedagogy training on their ability to integrate technology (Jita and Dhliwayo, 2024). This approach focuses on individuals' perceptions of their lived experiences and is well-suited to exploring the meanings they ascribe to those experiences (Creswell & Creswell, 2017). A purposive sampling technique was employed to select 15 preservice teachers from 2 teacher education institutions in Lesotho. Participants were selected based on the following criteria:

Final-year preservice teachers enrolled in a bachelor of education program.

Preservice teachers who have completed teaching practice.

Preservice teachers who have been exposed to some form of digital tools or technology modules during training and researcher's convenience (Janson & Glenwick 2018).

The sample size is deemed sufficient for a phenomenological study, allowing for rich, detailed accounts while maintaining manageability (Braun and Clarke, 2022). Ethical clearance was obtained from the University of the Free State's Research Ethics Committee. Participants were informed of the study's aims, their right to withdraw at any time, and confidentiality. Written informed consent was obtained from all participants and pseudonyms were used in transcripts and reports to protect participant identities (Braun and Clarke, 2022). Data was collected through semi-structured interviews held with individual preservice teachers, allowing for flexibility in probing participants' experiences while still maintaining a consistent line of inquiry across interviews (Jita & Dhliwayo, 2024). Interviews lasted approximately 45 to 60 minutes each and were conducted in person or via Zoom, depending on participant availability and preference. All interviews were audio-recorded with participants' consent and transcribed verbatim for analysis (Creswell & Creswell, 2017). Then, four themes emerged from data and anyalysed using thematic analysis approach (Braun and Clarke, 2022).

Findings and Discussions

Limited Integration of Technology

This study found that there is limited digital pedagogy training which significantly hinders effective technology integration among preservice teachers in Lesotho. Many of the participants indicated that they were still relying more on the use of traditional methods such as chalk-and-talk due to a lack of confidence or exposure to technology-based strategies. This is due to the minimal training that preservice teachers received during their initial training because their lecturers are still focusing on traditional teaching methods. Like Mezirow (1978) showed, limited training fails to change preservice teachers' beliefs about technology and this missed opportunity results in the skill gap that hinders effective teaching. The minimal training that preservice teachers receive in technology integration during their initial teacher education significantly impacts their professional readiness. In addition, many participants demonstrated only surface-level use of digital tools instead of leveraging technology to support active, learner-centred teaching, using digital tools, as they believed that using PowerPoint slides implies integration. These findings concur with Jita (2016) who indicated that when there are no guidelines on how to integrate technology into teaching and learning, nor a set of performance standards to assess integration, preservice teachers struggle with integration. Without adequate modeling and practice during their training, preservice teachers are likely to develop resistance to technology integration, viewing it as supplementary rather than essential to effective teaching and learning. Hence, teacher education institutions need to embed digital pedagogy more deeply into all programs and not as an add-on or elective as is the case currently. Limited training leaves preservice teachers underprepared for modern teaching environments, affecting both their career readiness and students' learning outcomes.

Techno-Pedagogical Anxiety and Digital Competence

Many of the participants expressed themselves having techno-pedagogical anxiety and self-efficacy in using technology. They gave, as a reason for the inadequate training during teacher education, uncertainty about which tools to use, when, and how to integrate them pedagogically. Preservice teachers might also lack practical experience because digital tools are often introduced theoretically in lecture rooms, that is, without opportunities to practice in real-life teaching contexts. Hence, this leaves them with low confidence and low digital competence leading to them immigrating digitally when teaching. As Chisango and Marongwe (2018) attested, preservice teachers remain digital immigrants due to a lack of technology infrastructure or poor connection, disabling them from using the Internet due to poor network coverage. The limited application also advocates a disconnection between preservice teachers' technological competence and pedagogical intent, reinforcing the need for further training that would link digital tools to learning outcomes which confirms that they are transformed. This reflects a gap between knowing how to use technology and knowing how to teach technology which imply no learning took place as Mezirow (1978) indicated. It also goes along with Kalanda & De Villiers (2013) and Chigona et al (2013) that when digital pedagogy is embedded in teacher education programmes preservice teachers are likely to be more confident and innovative.

Fear of Failure

The findings further revealed that many participants have developed fear of failure when using unfamiliar tools. Many of the participants do not integrate technology because they feared that technology might fail during lessons or that they would not be able to fix issues on the spot;

hence, they decided not to attempt using it in their teaching. Since technology is unpredictable, many preservice teachers are likely to express anxiety about what will happen if a tool fails in the middle of the lesson and they avoided integrating technology due to fear of failure, poor troubleshooting skills, or unfamiliarity with digital tools. Due to limited digital pedagogy, preservice teachers are reluctant to use technology tools. This reluctance inhibits their ability to experiment and try innovate strategies in their teaching practice. It concurs with Nanjundaswamy et al (2021) and Singh (2013) that when preservice teachers are not properly prepared for technology integration, they develop fear of losing reputation and decide not to use technology because they do not want to fail in front of their students or fail to fix it. This lack of exposure creates a confidence and vision gap among preservice teachers which is likely to last for the rest of their teaching profession, that is, with low self-efficacy. As a result, they might feel completely lost trying to navigate websites or unfamiliar websites which were not part of their training. When digital teaching is not part of their mental model of good teaching, it is harder for preservice teachers to imagine or prioritize technology integration in their own practices.

Insufficient Training in Digital Pedagogy

It also emerged from the study findings that a lack of hands-on training has led to low self-efficacy among preservice teachers. They should be trained to use their mobile learning tools because of the low-resource and relevant for those teaching in the rural contexts. Many avoid integrating technology due to a fear of failure, poor troubleshooting skills, or unfamiliarity with digital tools. Due to limited digital pedagogy, preservice teachers are reluctant to use technology tools. This reluctance inhibits their ability to experiment and innovate in their teaching practice. Most training focuses on how to use a tool, using it to make PowerPoint rather than using it to enhance learning. This is what Khumalo and Du Plessis (2018) and Jita (2016) pointed out preservice teachers become immigrants when trained by lecturers who are not well trained in the use of technology, because both lack requisite experience and confidence to use technology. It implies that they use technology for the sake of using technology because they cannot evaluate what is appropriate for learners at any pointing time and not knowing which platform to use. Like Mezirow (1978) indicated, the training they received has not changed them. If they were not properly trained in how to use technology, they are less likely to view it as an essential part of teaching and learning, rather as optional. This means that pedagogical strategies for integrating technology, such as when and why to use video, gamification, or online collaboration, are often missing. If they are not trained in how to use technology, they are less likely to view it as a natural part of teaching and learning.

Policy and Practice Recommendations

The study suggests that higher education should integrate digital pedagogy across the curriculum. This will make it easy for preservice teachers to get used to using technology for teaching and learning purposes, rather than using some tools to teach, such as presenting slides. This was also suggested by Jita, 2016) that technology should be compulsory for all preservice teachers. Teacher education programs should embed digital pedagogy into all content areas and not just present it as a technology course, as preservice teachers are not hands-on with the use of technology due to insufficient infrastructure. Higher education should emphasize when, why, and how preservice teachers must integrate digital tools for deeper learning. Schools where preservice teachers are to be placed during teaching practice should also be encouraged to provide technology-integrated classrooms to enable preservice teachers to have hands-on

experiences. The support for preservice teachers should be designed so that digital lessons are delivered during teaching practice. Preservice teachers should be encouraged to use simulations, perform peer- and micro-teaching with technology, and use digital sandbox spaces for hands-on learning. This will build their confidence through practical exposure. Additionally, structured mentorship should be provided by digitally experienced lecturers. Teachers should be trained in using mobile learning tools especially because they are relevant for low-resourced or rural contexts. Offline-compatible platforms can be included in training to promote mobile-friendly pedagogy. Preservice teachers should be empowered to move beyond consumption by training them to create digital learning materials, such as videos, podcasts, and interactive quizzes, as a means of offering training.

Conclusion

In conclusion, this study proved that limited digital pedagogy training has a significant and multifaceted impact on the integration of technology in classrooms among preservice teachers. Even though these preservice teachers have basic digital literacy, the lack of pedagogically grounded training impedes them from using technology in ways that will enhance teaching and learning. If they continue without these skills, they might be disconnected from learner-centred strategies and modern instructional goals. The findings reveal that without targeted digital pedagogy training, preservice teachers experience low confidence and are likely to revert to traditional teaching practices due to the lack of skills to integrate digital tools in a meaningful manner. These limitations not only hinder their ability to meet the demands of 21st century classrooms but also restrict the transformative potential of educational technology in the local context. To address this challenge, a systemic shift is required in higher education that will move beyond tool-focused training to a comprehensive approach that embeds digital pedagogy throughout the curriculum. Hence, by prioritizing practical experiences, mentorship, and reflective practice, teacher preparation programs can cultivate digitally competent preservice teachers who are capable of leveraging technology to support inclusive, innovative, and effective teaching.

References

Bhattacharjee, B., & Deb K. (2016). Role of ICT in 21st century's teacher education. International Journal of Education and Information Studies, 6(1): 1–6.

Braun V., & Clarke V. (2022). Conceptual and design thinking for thematic analysis. Qualitative Psychology, 9(1): 3-26

Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of literature. International Journal of Education and Development Using Information and Communication Technology, 8(1): 136–155.

Chere-Masopha, J.M. (2018). Personal landscapes of teacher professional identities versus digital technology adoption and integration in Lesotho schools. International Journal of Learning, Teaching and Educational Research, 17(3): 28–42. https://doi.org/10.26803/ijlter.17.3.3

Chigona A., Chigona W., & Davids, Z. (2014). Educators' motivation on integration of ICTs into pedagogy: Case of disadvantaged areas. South African Journal of Education, 34(3): 1–8.

Chisango, G, & Marongwe, N. (2018). The impact of inadequate information and communication technologies on teaching and learning of pre-service teachers at a rural university in South Africa. Journal of Communication, 9(1–2): 1–10. https://doi.org/10.31901/24566586.2018/09.1-2.232

Creswell, J.W, Creswell JD. (2017). Research design: Qualitative, quantitative, and mixed methods

approach, 4th ed. Newbury Park: Sage.
Creswell, J.W, Poth CN. (2018). Qualitative inquiry and research design choosing among five approaches, 4th ed. Thousand Oaks, CA: SAGE Publications.
Dagdilelis, V. (2018). Preparing teachers for the use of digital technologies in their teaching practice. Research in Social Sciences and Technology. 2018, 3(1): 109–121. https://doi.org/10.46303/ressat.03.01.7
Jason, LA, Glenwick DS, eds. (2018). Handbook of methodological approaches to community-based research: Qualitative, quantitative, and mixed methods. Oxford University Press.
Jita, T & Dhliwayo A. (2024). Design-based approach to technology innovation: Teacher educators' experiences with tablets as instructional tools in South Africa. Contemporary Educational Technology, 16(3): ep520. https://doi.org/10.30935/cedtech/14850
Jita, T. (2016). Pre-service teachers' competence to teach science through information and communication technologies in South Africa. Perspectives in Education. 2016, 34(3): 15–28. https://doi.org/10.38140/pie.v34i3.1965
Kalanda, K & De Villiers MR. (2013). E-learning in the science curriculum: A study in selected high schools in Lesotho. In: Herrington J, Couros A, Irvine V (editors). Proceedings of Education Media 2013--World Conference on Educational Media and Technology, 24 June 2013; Victoria, Canada: Association for the Advancement of Computing in Education (AACE). pp. 1664–1673. https://www.learntechlib.org/primary/p/112189/
Khumalo S, Du Plessis T. (2024). Commercialisation dynamics system principles and support units of entrepreneurial universities. South African Journal of Information Management, 26(1): a1619. https://doi.org/10.4102/sajim.v26i1.1619
Kurata L, Selialia M, Molefi R, Rateronko SF. (2024). Integrating educational technology into Lesotho secondary religious studies: A conceptual exploration of practical challenges and opportunities. International Journal of Science and Research Archive, 13(01), 2838–2847. https://doi.org/10.30574/ijsra.2024.13.1.1933
Lekhetho M. (2021). Exploring factors influencing the performance of high-achieving secondary schools in Lesotho. Issues in Educational Research. 2021, 31(3): 871–891.
Liu Y, Amin R, Stemmler, H. (2023). Accelerating postpandemic, yet a widening divide. Digital Progress & Trends Report.
Marais E. (2023). The development of digital competencies in pre-service teachers. Research in Social Sciences and Technology, 8(3): 134–154. https://doi.org/10.46303/ressat.2023.28
Mezirow J. (1978). Perspective transformation. Adult Education. 1978, 28(2): 100–110. https://doi.org/10.1177/074171367802800202
Molise H, Dube, B. (2020). Emergency online teaching in economic and management sciences necessitated by the Covid-19 pandemic: The need for healthy relations in a rural schooling context. International Journal of Learning, Teaching and Educational Research, 19(6): 387–400. https://doi.org/10.26803/ijlter.19.6.23
Moonasamy AR, Naidoo, GM. (2020). Digital learning: Challenges experienced by South African university students' during the COVID-19 pandemic. The Independent Journal of Teaching and Learning, 17(2): 76–90. https://hdl.handle.net/10520/ejc-jitl1-v17-n2-a6
Nanjundaswamy, C., Baskaran, S., & Leela, M.H. (2021). Digital pedagogy for sustainable learning. Shanlax International Journal of Education, 9(3): 179–185 https://doi.org/10.34293/education.v9i3.3881
Olatokun W, Ntemana TJ. (2015). Information and communication technology (ICT) use by lecturers at the National University of Lesotho. Indian Journal of Library and Information Science, 9(1): 5–23.

https://dx.doi.org/10.21088/ijlis.0973.9548.9115.1
Orlando J, Attard C. (2016). Digital natives come of age: The reality of today's early career teachers using mobile devices to teach mathematics. Mathematics Education Research Journal, 28: 107–121. https://doi.org/10.1007/s13394-015-0159-6
Singh JP. (2013). Information technologies, meta-power, and transformations in global politics. International Studies Review, 15(1): 5–29. https://doi.org/10.1111/misr.12025
Smith PJ. (2019). Digital transformation and infrastructure development. Journal of Technology Management, 21(3): 165−178.
Tondeur L, Van Braak J, Ottenbreit-Leftwich A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. Educational Technology Research and Development, 65(3): 555–575. https://doi.org/10.1007/s11423-016-9481-2
Tsybulsky D, Oz A. (2019). From frustration to insights: Experiences, attitudes, and pedagogical practices of preservice science teachers implementing PBL in elementary school. Journal of Science Teacher Education, 30(3): 259–279. https://doi.org/10.080/1046560X.2018.1559560
Van Dijk J. (2020). The digital divide. Association for Information Science and Technology. 2020, 1–3. https://www.researchgate.net/publication/336775102_The_Digital_Divide
Wami CK, Kobani D. (2021). Information and communication technology tools for effective performance of adult learners in Port Harcourt Metropolis, Rivers State. International Journal of Advance Research and Innovative Ideas in Education, 7(3): 2831–2841.
Wang X, Lin X, Shao B. (2022). Artificial intelligence changes the way we work: A close look at innovating with chatbots. Journal of the Association for Information Science and Technology, 74(3): 339–353. https://doi.org/10.1002/asi.24621
Lekhetho M. (2018). Exploring factors influencing the performance of high-achieving secondary schools in Lesotho. Issues in Educational Research, 31(3): 871–891.
Liu Y, Amin R, Stemmler, H. (2023). Accelerating postpandemic, yet a widening divide. Digital Progress & Trends Report.
Marais E. (2023). The development of digital competencies in pre-service teachers. Research in Social Sciences and Technology, 8(3): 134–154. https://doi.org/10.46303/ressat.2023.28
Mezirow J. (1978). Perspective transformation. Adult Education, 28(2): 100–110. https://doi.org/10.1177/074171367802800202
Molise H, Dube, B. (2020). Emergency online teaching in economic and management sciences necessitated by the Covid-19 pandemic: The need for healthy relations in a rural schooling context. International Journal of Learning, Teaching and Educational Research, 19(6): 387–400. https://doi.org/10.26803/ijlter.19.6.23
Moonasamy AR, Naidoo, GM. (2022). Digital learning: Challenges experienced by South African university students' during the COVID-19 pandemic. The Independent Journal of Teaching and Learning, 17(2): 76–90. https://hdl.handle.net/10520/ejc-jitl1-v17-n2-a6
Nanjundaswamy, C., Baskaran, S., & Leela, M.H. (2021). Digital pedagogy for sustainable learning. Shanlax International Journal of Education, 9(3): 179–185. https://doi.org/10.34293/education.v9i3.3881
Olatokun W, Ntemana TJ. (2015). Information and communication technology (ICT) use by lecturers at the National University of Lesotho. Indian Journal of Library and Information Science, 9(1): 5–23. https://dx.doi.org/10.21088/ijlis.0973.9548.9115.1
Orlando J, Attard C. (2016). Digital natives come of age: The reality of today's early career teachers using

mobile devices to teach mathematics. Mathematics Education Research Journal, 28: 107–121. https://doi.org/10.1007/s13394-015-0159-6

Singh JP. (2013). Information technologies, meta-power, and transformations in global politics. International Studies Review. 2013, 15(1): 5–29. https://doi.org/10.1111/misr.12025

Smith PJ. (2019). Digital transformation and infrastructure development. Journal of Technology Management, 21(3): 165−178.

Tondeur L, Van Braak J, Ottenbreit-Leftwich A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. Educational Technology Research and Development, 65(3): 555–575. https://doi.org/10.1007/s11423-016-9481-2

Tsybulsky D, Oz A. (2019). From frustration to insights: Experiences, attitudes, and pedagogical practices of preservice science teachers implementing PBL in elementary school. Journal of Science Teacher Education, 30(3): 259–279. https://doi.org/10.080/1046560X.2018.1559560

Van Dijk J. The digital divide. Association for Information Science and Technology. 2020, 1–3. https://www.researchgate.net/publication/336775102_The_Digital_Divide

Wami CK, Kobani D. (2021). Information and communication technology tools for effective performance of adult learners in Port Harcourt Metropolis, Rivers State. International Journal of Advance Research and Innovative Ideas in Education, 7(3): 2831–2841.

Wang X, Lin X, Shao B. (2022). Artificial intelligence changes the way we work: A close look at innovating with chatbots. Journal of the Association for Information Science and Technology, 74(3): 339–353. https://doi.org/10.1002.