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ROLE OF DIGITAL TOOLS IN SHAPING PEDAGOGICAL PRACTICES OF TEACHER EDUCATORS

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RESEARCH ARTICLE

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Abstract
The rapid integration of digital tools in education has significantly transformed pedagogical practices a lot, particularly in the field of teacher education. This present study explores the role of digital tools in determining the instructional approaches of teacher educators. The study is based on existing literature that aims to understand how digital technologies influence teaching methods, engagement strategies, assessment practices, and professional development of teacher educators. Findings of the study reveal that digital tools promote student-cantered pedagogy, peer collaboration, and innovative instructional design. However, several challenges such as inadequate training, lack of infrastructure, lack of skilled educator, and limited pedagogical integration is very prominent. The study also highlights the importance of digital competence and institutional support in promoting the pedagogical potential of digital tools. It concludes that effective integration of digital tools requires a shift from use of technology to pedagogically meaningful application of such.

Keywords: *digital tools, teacher education, pedagogical practices, digital competence, e-learning, instructional innovation*

Introduction

The rapidly growing influence of digital technologies has redefined educational practices across the globe, particularly within teacher education programs. Teacher educators play a significant role in shaping the pedagogical approaches of prospective teachers, and the integration of digital tools has become the key to this responsibility. Digital tools such as learning management systems, virtual classrooms, university management systems, and collaborative platforms are increasingly used to enhance the effectiveness of teaching-learning processes. These advanced technologies have resulted in a shift from traditional teacher-cantered instruction to more interactive and learner-cantered pedagogies. Research studies show that digital competence is closely linked to pedagogical effectiveness, as educators who effectively integrate technology tend to adopt innovative teaching strategies that enhance learning outcomes (Behera & Behera, 2026). Moreover, the rapid digitalization in the field of education has created new expectations for teacher educators to develop and integrate effective digital pedagogies. In spite of these advancements, the integration of digital tools remains uneven. A lot of teacher educators struggle to use digital tools for pedagogical purposes that often limits their use to administrative or content delivery functions (Amhag et al., 2019). This focuses on the need to identify how digital tools actually shape pedagogical practices rather than merely being adopted as technological add-ons.

Literature Review

Digital pedagogy refers to the purposeful integration of technology into teaching-learning process that helps to enhance learning experiences. It encompasses not only the use of digital tools but also the transformation of instructional approaches as well as the learning environments. According to Rawat et al. (2024), digital pedagogy emphasizes on meaningful engagement, real-world application, and learner-centered strategies through technological support. Väätäjä and Ruokamo (2021) identified that digital pedagogy promotes socio-constructivist approaches, where learners actively participate in the construction of knowledge through collaboration and digital interaction. Behera and Behera (2026) found a significant positive relationship between digital competence and pedagogical practices. It indicates that educators with higher digital skills are more likely to adopt innovative teaching methods. Similarly, Gupta (2019) demonstrated that training in e-learning tools significantly improves instructional

effectiveness and technological proficiency of the teacher educators. Amhag et al. (2019) in their study reported that teacher educators often lack pedagogical understanding of digital tools that leads to superficial usage of the same. Mahyoub (2025) further emphasized that educators recognize the potential of digital tools but there are some certain barriers such as limited training, poor infrastructure, and lack of institutional support that hinder the effective implementation of the same. In the Indian context, Kaur et al. (2026) highlighted that adoption of digital pedagogy is influenced by institutional factors, access to resources, as well as beliefs and attitudes of teachers. So, findings of all these indicate that digital transformation in teacher education is a complex process with multiple variables.

Research Questions

1. What are the influences of digital tools in pedagogical practices in teacher education?
2. What are the key benefits of technology integration (digital tools) in teacher education?
3. What are the challenges in using digital tools effectively in teacher education?

Objectives of the Study

1. To examine the role of digital tools in the pedagogical practices in teacher education.
2. To analyse the benefits of technology integration (digital tools) in teacher education.
3. To identify challenges and barriers in the implementation of digital tool effective in teacher education.

Methodology of the Study: This present study follows a qualitative research approach. Secondary sources such as research articles on digital pedagogy and teacher education were reviewed systematically. Sources were selected based on their relevance and credibility.

Results and Discussion

Role of Digital Tools in the Pedagogical Practices in teacher education

Digital tools have transformed pedagogical practices from traditional to interactive approaches i.e. from teacher-cantered instruction to learner-cantered and interactive approaches. Technologies such as learning management systems (LMS), university management systems (UMS), multimedia applications, virtual classrooms, artificial intelligence, and collaborative platforms have significant influence on the teaching learning process. According to Koehler and Mishra (2009), effective integration of technology is depended on the interaction between technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) i.e. TPACK framework. This framework highlights that digital tools are not just supplementary resources but also a very essential component in modern day teaching learning practices. Additionally, digital tools help in the active and collaborative learning among the learners. Platforms such as Google Classroom, Moodle, Zoom, and Microsoft Teams encourage student participation through communication, discussion and group-based learning activities. Research study by Means et al. (2013) found that technology oriented learning environments improve not only the engagement but also the academic achievement of the learners as compared to conventional classroom methods. Digital simulations, videos and interactive presentations also help learners to understand complex concepts more effectively by catering to diverse learning styles (Mayer, 2014).

Digital tools further support personalized learning by enabling teachers to adapt instructional content according to individual learning needs and pace of the learners. Adaptive learning technologies and online assessment systems provide immediate feedback to the learners that help them to monitor their progress independently (Trust & Whalen, 2020). In addition, digital pedagogy promotes essential competencies for the twenty-first century such as critical thinking, creativity, and problem-solving skills (Voogt et al., 2013). The COVID-19 pandemic showed the importance of digital technologies in ensuring continuity of education through remote learning systems. Dhawan (2020) observed that online learning platforms became very important in maintaining educational activities during school closures worldwide that demonstrated the growing dependence on digital pedagogy in both formal and informal learning environments. Therefore, digital tools have become fundamental in shaping teaching strategies, classroom interaction, educational delivery systems and needs of the learners.

Benefits of Integration of Digital Tools in Teacher Education

The integration of digital tools in teacher education has various academic and professional benefits. One of the most significant advantages is the development of digital competence of pre-service and in-service teacher educators. Modern educators are supposed to possess technological literacy along with the ability to integrate digital resources effectively in the classroom teaching. Tondeur et al. (2016) argued that teacher education programs improve confidence, preparedness and instructional effectiveness of teachers that have the integration of technology in the teaching learning process. Also, digital tools give additional opportunity in the professional development of educators. Teachers can continuously update their pedagogical and technological knowledge through different webinars, online courses, virtual conferences, professional learning communities and other related activities. Redecker (2017) emphasized that digital competence helps the teachers to innovate different teaching methods. It enables their lifelong professional learning.

Another important benefit is that it improves accessibility and inclusivity in the field of education. Assistive technologies such as screen readers, speech recognition software, subtitles translation tools etc. help learners with disabilities and diverse educational needs. UNESCO (2021) highlighted that by increasing access to quality learning resources digital technologies

reduce educational inequalities irrespective of geographical barriers. Online learning platforms also allow flexible learning schedules. It helps the students who may face physical, social, or economic barriers to attend traditional classes. Additionally, digital tools improve the mechanisms of assessment and feedback in teacher education. Online quizzes, e-portfolios, and automated grading systems provide immediate feedback. It helps both teachers and learners to monitor learning progress effectively (Garrison & Vaughan, 2007). Data analytics tools also help educators to identify student performance trends so that they can adapt instructional strategies accordingly.

Challenges and barriers in the implementation of digital tool in teacher education

Despite the significant benefits of digital technologies, several challenges hamper their effective implementation in the teacher learning process. One of the primary barriers is the inadequate technological infrastructure. Many educational institutions, especially in developing countries and rural regions, there is lack in proper internet connectivity, digital devices and technical support systems. The digital divide continues to give birth inequalities in terms of technology-oriented learning opportunities (UNESCO, 2021). Another important challenge is the lack of training among the teachers. While educational institutions are adopting digital technologies, many educators still struggle as they have limited technical skills and insufficient pedagogical understanding of technology integration. Ertmer and Ottenbreit-Leftwich (2014) noted that beliefs, attitudes and confidence of the teachers affect their willingness to adopt digital tools in classrooms significantly. Resistance to change and fear of technology of the teachers often create a barrier in the effective utilization of technology integration. Financial constraints also is one of the major difficulties in technology integration. The implementation of digital infrastructure requires lot of investment in hardware, software, internet services, and professional development programs for teachers. Educational institutions with limited funding are struggling to sustain technology integration initiatives over a long period of time (Selwyn, 2021). In many cases, outdated equipment and lack of maintenance reduce the effectiveness of digital teaching learning process.

Cybersecurity and ethical concerns are also the critical challenges in digital education. Over reliance on online platforms causes risks such as data breaches, cyberbullying, plagiarism, and unauthorized access to personal information among the teachers and the learners. According to Livingstone and Third (2017), educational institutions must have some certain policies to ensure responsible use of technology. Furthermore, excessive screen time and over dependence on digital devices may affect the concentration, social interaction, and mental well-being of the learners negatively. Another significant challenge is the lack of proper digital literacy among learners and teachers. Some learners have advanced technological skills, while others struggle to access digital platforms effectively. This imbalance is affecting the academic performance of the learners in technology-based learning environments. Therefore, institutions must provide continuous technical support with digital literacy training to both educators and learners.

Conclusion

This study reveals that digital tools has given a new shape to pedagogical practices in teacher education that now focusses on learner-cantered, interactive, personalized learning, as evidenced by the TPACK framework. Key benefits of technology integration include digital competence, accessibility, and professional development though different challenges such as infrastructure deficits, inadequate training, and cybersecurity risks. Addressing these barriers is very crucial for maximizing the effectiveness of digital pedagogy. Future research should explore longitudinal impacts along with context-specific interventions to ensure effective integration of technology (Behera & Behera, 2026; UNESCO, 2021).

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References

1. Amhag, L., Hellström, L., & Stigmar, M. (2019). Teacher educators' use of digital tools and needs for digital competence in higher education. *Journal of Digital Learning in Teacher Education, 35*(4), 203-220. https://doi.org/10.1080/21532974.2019.1646169
2. Behera, S., & Behera, L. (2026). Digital competence as a predictor of pedagogical practices among teacher educators: An empirical study. *Indian Journal of Educational Technology, 8*(1), 242-256.
3. Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49*(1), 5-22. https://doi.org/10.1177/0047239520934018
4. Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2014). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education, 42*(3), 255-284. https://doi.org/10.1080/15391523.2010.10782551
5. Garrison, D. R., & Vaughan, N. D. (2007). *Blended learning in higher education: Framework, principles, and guidelines*. Wiley Online Library. https://doi.org/10.1002/9781118269558

6. Gupta, D. (2019). Capacity building of teacher educators for e-learning tools: An experimental study. *Indian Journal of Educational Technology, 1*(2), 1-13. Retrieved from https://journals.ncert.gov.in/IJET/article/view/291
7. Kaur, D., Rana, S., Chaturvedi, N., Bahuguna, S., & Punia, V. (2026). Digital pedagogy in Indian higher education: Faculty perspectives. *Electronic Journal of e-Learning, 24*(2), 94-111. https://doi.org/10.34190/ejel.24.2.4189
8. Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60-70.
9. Livingstone, S., & Third, A. (2017). Children and young people's rights in the digital age: An emerging agenda. *New Media & Society, 19*(5), 657-670. https://doi.org/10.1177/1461444816686318
10. Mahyoub, R. A. (2025). Integrating digital tools in EFL teacher training: Opportunities, challenges, and pedagogical pathways. *Dibon Journal of Education, 1*(4), 332-344. https://doi.org/10.64169/dje.138.
11. Mayer, R. E. (2014). *The Cambridge handbook of multimedia learning* (2nd ed.). Cambridge University Press. https://doi.org/10.1017/CBO9781139547369
12. Means, B., Toyama, Y., Murphy, R., & Baki, M. (2013). The effectiveness of online and blended learning: A meta-analysis of the empirical literature. *Teachers College Record: The Voice of Scholarship in Education, 115*(3), 1-47. https://doi.org/10.1177/016146811311500307
13. Rawat, S., Tiwari, S., Sharma, M., & Chatterjee Singh, N. (2024). The digital pedagogy competence scale (DiPeCoS): Development and validation. *Research and Practice in Technology Enhanced Learning, 19*(18), 1-23. https://doi.org/10.58459.rptel.2024.19018
14. Redecker, C. (2017). *European framework for the digital competence of educators: DigCompEdu*. European Commission. https://dx.doi.org/10.2760/159770
15. Selwyn, N. (2021). *Education and technology: Key issues and debates* (2nd ed.). Bloomsbury Academic.
16. Tondeur, J., van Braak, J., Siddiq, F., & Scherer, R. (2016). Time for a new approach to prepare future teachers for educational technology use: Its meaning and measurement. *Computers & Education, 94*, 134-150. https://doi.org/10.1016/j.compedu.2015.11.009
17. Trust, T., & Whalen, J. (2020). Should teachers be trained in emergency remote teaching? Lessons learned from the COVID-19 pandemic. *Journal of Technology and Teacher Education, 28*(2), 189-199.
18. UNESCO. (2021). *Reimagining our futures together: A new social contract for education*. UNESCO Publishing.
19. Väätäjä, J. O., & Ruokamo, H. (2021). Conceptualizing dimensions and a model for digital pedagogy. *Journal of Pacific Rim Psychology, 15*, 1-12. https://doi.org/10.1177/1834490921995395