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Teacher Readiness for Digital Pedagogy Integration in Schools: Barriers and Support Mechanisms

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Abstract

Digital pedagogy is now an important part of contemporary education, but its successful implementation is significantly teacher readiness. This paper aims to understand teacher readiness for integrating digital pedagogy in schools, identify the key barriers that hinder its effective use, examine the institutional and professional support mechanisms available to teachers, and recommend strategies for improving and sustaining technology-supported teaching practices. The review indicates that while teachers generally exhibit basic digital abilities, they frequently struggle with using advanced competencies and pedagogical strategies required for effective technology integration in the classroom. There are still a few obstacles such as limited digital competence, poor infrastructure, inadequate training and resistance to change that restrict a meaningful use of digital resources in the classroom practices. The literature also points out the value of institutional and professional support systems like access to technological resources, supportive leadership, and the sustained, practice-based professional growth in boosting the confidence and competence of teachers. The paper summarizes that the concerted effort that incorporates a sustained training curriculum, adequate resources, and facilitative policies is needed to enhance the teacher readiness besides the successful and sustainable inclusion of digital pedagogy in school education.

Keywords: Teacher Readiness, Digital Pedagogy, Technology Integration, Digital Competence, Teacher Professional Development

Introduction

The active progress of the digital technologies within the educational sphere has changed the way of teaching, the demands on the competence of teaching and the school culture of learning in general. The planned utilisation of digital instruments, platforms and media in teaching-learning activities and, consequently, has been one of the central elements of contemporary educational systems, set to enhance the level of engagement, individualism, communication and access to different learning resources (Schindler et al., 2017; Laufer et al., 2021; García-Delgado et al., 2023). Digital technologies have led to new expectations for teacher digital competence and the integration of pedagogy with technological tools to improve quality and inclusivity in education (Revuelta-Domínguez et al., 2022; Azimkhan et al., 2025). Digital pedagogy is not a purely technological phenomenon, but it is a pedagogical phenomenon that assumes that teachers are capable, ready, and confident to design learning with the help of technology

(Ertmer, 1999). Thus, teacher readiness has become a determinant of success in digital implementation in schools.

Teacher readiness indicates the degree to which educators have expertise, capabilities and attitudes and dispositions necessary to accept and sustain digital teaching. It implies technical expertise alongside pedagogical understanding of how technology serves a crucial role in the provision of the curriculum and the learning outcomes of students. Teachers' technological readiness is closely linked to their actual application of technology in educational environments (Mane, 2025). This readiness is theorised in the TPACK framework developed by Mishra and Koehler (2006) that presupposes the cooperation of Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). The synergy of the three domains of knowledge is the defining factor of the competence of a teacher with regard to the incorporation of digital resources in designing and providing instructive activities. Thus, the idea of readiness is multidimensional and educators should simultaneously consider the requirements of curriculum, students and technology affordances.

In the majority of school systems, technology-enabled education is becoming a policy focus. National and international agencies have identified digital pedagogy as a key controller of inclusive and equitable learning opportunities (UNESCO, 2026; UNICEF, UNESCO & ITU, 2026). The Ministry of Education (2020) in India claims the applicability of teacher capacity-building in the effort to establish technology-based learning settings (Vats, 2024; Meena, 2025). The policy calls for the development of digital infrastructure, well-designed digital materials, and systematic teacher training to enhance digital literacy and pedagogical innovation across educational settings (Vats & Malik, 2024; Meena, 2025). However, empirical evidence indicates that the implementation of digital tools in classrooms remains uneven, with persistent challenges related to infrastructure gaps, limited teacher preparedness, and socio-economic disparities that constrain the equitable use of digital pedagogies (Jolly, 2025). However, there is an uneven implementation of digital tools in the classroom despite the strong policy support and the ubiquitous nature of the digital tools.

One of the main factors that contributes to this inconsistency is the fact that many teachers continue to have to face numerous barriers that restrain their ability to adopt digital pedagogy. The issues that were always highlighted in the research are poor digital infrastructure, poor access to devices, poor internet services, poor structural training, lack of teacher confidence, time constraints and poor continuation opportunities of technology supported professional development (Bingimlas, 2009; Hew and Brush, 2007; Pelgrum, 2001). Internal factors such as teachers' beliefs, attitudes and self-efficacy significantly shape the use of technology, often acting as barriers when teachers lack confidence or are reluctant to modify established instructional practices (Ertmer, 2005; Sang et al., 2010; Teo, 2011). Moreover, many schools believe that integrating technology in education as a challenging process, largely due to the work pressure, lack of competence, limited time and insufficient institutional support to experimentation and innovation (Hew & Brush, 2007; Bingimlas, 2009).

Institutional culture is also very crucial. The schools where the leadership actively supports digital experimentation, mentorship, and reward of teacher input have a better opportunity to make a permanent digital learning space. Research has shown that transformational and supportive leadership practices significantly influence teachers' beliefs, skills and readiness to engage with technology in their instruction (Landa et al., 2023). Some of the support systems that have been identified to have a significant influence on teacher confidence and long-term integration practices are peer collaboration, mentoring networks, school-based ICT coordinators and professional learning communities (Prenger et al., 2021). According

to Fullan (2021), change in education can only be maintained when the teachers feel that they are supported, valued, and can exercise professional agency in making adjustments to the new practices.

The shift towards the digital version of pedagogy also necessitates the transformation of the teacher-centred pedagogy to inquiry-based and learner-centred learning, where students actively engage in questioning, collaborating and constructing meaning instead of being a passive recipient of information (Sotiriou et al., 2020; Attard et al., 2021). This pedagogical transformation is closely associated with the meaningful integration of digital tools, which facilitate interactive, collaborative and student-driven learning experiences. Consequently, teachers are required to reorganise the classroom practices, curriculum and patterns of interaction so that participatory and collaborative learning environments can be created (Ertmer, 2005; Fullan, 2013). However, the redesigning pedagogy is not a simple one and cannot be attained by training in technology alone. Teachers require reflective professional learning that supports them in critically examining their instructional roles, adapting their teaching methods, and thoughtfully applying technology in ways that respond to the diverse needs of heterogeneous learners, which enhances both pedagogical competence and inclusive practice (Fütterer et al., 2024).

The COVID-19 pandemic further increases the awareness of the need to be digitally ready in teaching in the world as a whole. In many countries, teachers were compelled to transition almost overnight to digital instruction, a shift that revealed widespread gaps in digital skills and technological preparedness (Perifanou et al., 2021; García et al., 2022). Studies show that, although some educators were able to adapt and develop new competencies, many struggled with planning effective online lessons, engaging students, and maintaining meaningful interaction through digital platforms (Perifanou et al., 2021; García et al., 2022). This experience reinstated the importance of teacher readiness as a requirement in robust and future-facing education systems.

Digital pedagogy, as a domain within pedagogical science, encompasses the application of digital tools in instruction to improve the overall teaching-learning experience (Cabanero et al., 2022; Toktarova & Semenova, 2020). Digital pedagogy, broadly defined, involves the pedagogical application of digital tools to improve instruction, learning, and assessment (Kivunja, 2013; Väätäjä & Ruokamo, 2021). It can be conceptualized through three main dimensions: pedagogical orientation, pedagogical practices, and digital pedagogical competencies, which together guide effective integration of technology in education (Väätäjä & Ruokamo, 2021). Although the concept of digital pedagogy has gained significance in modern education, the level of teacher readiness is disproportionate in various settings, particularly in a school with a low technology level or insufficiently qualified professional growth possibilities. The effective implementation of digital pedagogy requires not only access to tools but also teachers' capability to incorporate them effectively into practice (Trujillo-Juárez et al., 2025). It will be necessary to learn to a greater detail the particular obstacles that impede the work of teachers and the type of support mechanisms that can assist in the implementation of a long-term adoption. These concerns ought to be confronted to not only improve the quality in teaching but also to introduce this educational equity and digital inclusivity to the school systems.

Specifically, this study focuses on understanding teachers' readiness for digital pedagogy, identifying the key barriers they face, examining institutional and professional support mechanisms, and recommending strategies to enhance sustainable technology-supported teaching practices.

Objectives

1. To understand teachers' readiness for integrating digital pedagogy in schools.

2. To identify key barriers that restrict or delay teachers' effective use of digital tools in classroom practices.
3. To examine the institutional and professional support mechanisms available to teachers for digital pedagogy implementation.
4. To recommend strategies for improving teacher readiness and sustaining technology-supported teaching practices in school settings.

Methodology

This study is based on a narrative literature review using secondary data. It does not involve primary data collection. Instead, it synthesizes insights from existing scholarly research on digital pedagogy and teacher readiness. Relevant literature was retrieved from Google Scholar, ERIC, and ResearchGate.

1. Teacher readiness for the integration of digital pedagogy in schools.

Teacher readiness for the integration of digital pedagogy in schools is a multidimensional construct encompassing technological, pedagogical, and attitudinal dimensions (Mishra & Koehler, 2006; Ertmer & Ottenbreit-Leftwich, 2010; Tondeur et al., 2017). This readiness can be effectively understood through frameworks such as Technological Pedagogical Content Knowledge (TPACK) and the European Framework for the Digital Competence of Educators, which emphasise the integration of technological, pedagogical, and content knowledge along with reflective and adaptive teaching practices (Mishra & Koehler, 2006; Koehler & Mishra, 2009; Redecker, 2017).

It is suggested in the literature that several dimensions can identify most of the digital readiness of the teacher, and they are technological proficiency, pedagogical competence, technology attitudes, and self-efficacy to combine technology (Ertmer & Ottenbreit-Leftwich, 2010; Inan & Lowther, 2010; Tondeur et al., 2017). Teacher readiness also encompasses broader digital competencies, including the ability to design instruction that meaningfully integrates technology, as well as attitudinal factors such as openness to innovation and perceived usefulness of digital tools (Ertmer & Ottenbreit-Leftwich, 2010; Mishra & Koehler, 2006; Koehler & Mishra, 2009). It is determined that instructional design competence of teachers, including the capability to align technology with learning goals, is, however, not uniformly distributed across environments.

The literature consistently highlights that the attitudinal variables, such as the openness to innovation, the perceived effectiveness of technology and attitudes towards the capabilities of the students, are the influential variables of readiness (Ertmer and Ottenbreit-Leftwich, 2010). Teacher readiness, shaped by their beliefs and computer proficiency, significantly influences technology integration (Inan & Lowther, 2010).

Overall, the literature reflects a varied level of teacher readiness for digital pedagogy. Teachers are becoming more aware of the necessity of digital pedagogy, but a lack of advanced digital skills, the ability to integrate pedagogies, and the sustainability of confidence appear to be the impediments to general preparedness in technology-enhanced instruction.

2.Barriers that restrict or delay teachers' effective use of digital tools in classroom practices.

The classroom adoption of digital use is very much dependent on the readiness of the teachers, their level of confidence, and the support structures in the various schools. However, it has always been shown in literature that there are several barriers (both internal and external) that are likely to restrain or retard the successful implementation of digital technologies by teachers (Ertmer, 1999; Hew & Brush, 2007; Tondeur et al., 2017). These challenges arise because of the skill gap, infrastructure limitations, institutional

limitations, and teacher beliefs about technology (Bingimlas, 2009; Ertmer & Ottenbreit-Leftwich, 2010). The said challenges are essential in determining the factors that have yet to bring about uniformity in the process of integrating digital pedagogy and how the interventions in question can be utilised in order to make the teachers more digitally prepared.

I. Inadequate digital competence and low self-efficacy: Teachers lack digital pedagogical knowledge and ICT skills, that is why they feel less confident to perform in relation to the application of digital resources in the classroom (Howard et al., 2021; Instefjord and Munthe, 2017). This limited competence not only affects teachers' capability to select appropriate digital resources but also reduces their willingness to experiment with innovative teaching practices, thereby constraining meaningful technology integration in classroom instruction (Ertmer & Ottenbreit-Leftwich, 2010; Tondeur et al., 2017; Koehler & Mishra, 2009).

II. Limited access to digital infrastructure and resources: Lack of the digital infrastructure such as poor internet connectivity, an insufficient amount of equipment, and outdated equipment will become a major obstacle to technological adoption (Bingimlas, 2009; König et al., 2020). The accessibility is minimal and the discouragement to the teachers to plan lessons in digital tools is high. Inadequate infrastructure not merely restricts availability to digital tools but also creates uncertainty in their consistent use, leading teachers to depend on conventional teaching practices instead of integrating technology into their pedagogical approaches (Ertmer, 1999; Hew & Brush, 2007; Tondeur et al., 2017).

III. Insufficient professional development and training: Most of the teachers' express that they have minimal training opportunities that tend to be theoretical and that are not aligned to classroom needs and requirements, hence less inclined to use digital tools (Instefjord & Munthe, 2017). Insufficient training limits teachers' effective use of technology (Mane, 2025; Lawless & Pellegrino, 2007; Hew & Brush, 2007). Research shows that single-session workshops are inadequate, whereas ongoing, interactive, and contextually specific training brings long-term improvement (Asfahani et al., 2024).

IV. Time constraints and workload pressure: Time constraint is a major obstacle for teachers in incorporating ICT, limiting their capability to plan, prepare, and execute technology-based instruction effectively (Bingimlas, 2009; Schoepp, 2005; Hew & Brush, 2007). Limited time due to rigid schedules and curriculum demands often prevents teachers from meaningfully embedding technology in classroom practices (Lim & Chan, 2007; Tondeur et al., 2017).

V. Negative attitudes, resistance to change and fear of failure: Teachers who perceive digital tools as unnecessary, tricky and risky will be less inclined to implement it in teaching (Ertmer, 1999). Less favourable attitudes also lead to reduced use of technology (Mane, 2025; Teo, 2011).

Overall, these challenges emphasize the need for comprehensive institutional and pedagogical support systems to foster effective digital pedagogy integration.

3. The institutional and professional support mechanisms available to teachers for digital pedagogy implementation.

The availability of institutional and professional support mechanisms plays a vital role in enabling teachers to proficiently implement digital pedagogy. Empirical studies have indicated that well-structured support systems considerably boost teachers' capability to embed technology in their teaching methods (Philipsen et al., 2019; Tondeur et al., 2017). The research further indicates that systematic, collaborative, and practice-based teacher professional development (TPD) programs have a significant influence on the ability of teachers to use digital tools in the teaching process (Amemasor et al., 2025; Desimone, 2009; Philipsen et al., 2019). These efforts typically include continuous workshops, practical training, mentoring,

coaching and peer group work, which assists to enhance digital skills and teaching self-confidence of teachers (Trust et al., 2016; Koehler & Mishra, 2009; Ertmer & Ottenbreit-Leftwich, 2010).

An institutional and professional support mechanism that is available and effective in terms of digital pedagogy implementation is also a crucial factor for effective execution of this digital pedagogy to teachers. Digital pedagogy cannot be achieved solely by technology tools; it should also be accompanied by support systems, which will promote the development of pedagogical skills, confidence, and motivation of the teacher to incorporate digital tools in the classroom (Tan et al., 2024; Tondeur et al., 2017; Philipsen et al., 2019).

I. Institutional Support Mechanisms

The support of digital pedagogy by institutions is part of the fundamentals of adopting digital pedagogy by teachers. The literature always mentions the institutional support that involves the availability of technological infrastructure, access to digital resources, administrative support, policy guidance, and time to plan and learn professionally (Hew & Brush, 2007; Tondeur et al., 2017; Nielsen et al., 2024). Proper infrastructure, including proper internet connectivity, digital devices, learning management systems, and technical support, plays a great part in the willingness and capability of teachers to utilise digital tools successfully (Liu et al., 2024).

In addition, the institutional vision and leadership facilitation are determinants of the digital pedagogy implementation. With effective policies, incentives, and acknowledgement of the work of teachers by school leadership to facilitate the active promotion of digital innovation, the chances of educators adopting technology-supported teaching practices increase (Nielsen et al., 2024; Dexter, 2011; Tondeur et al., 2017). Recent literature indicates the significance of localized and context-sensitive institutional support. For instance, studies conducted in low-resource educational settings demonstrate that institutional mechanisms such as peer-based support systems and technology helplines can effectively address teachers' pedagogical and technological challenges (Trust et al., 2016; Varanasi et al., 2024). These supportive measures are particularly valuable in bridging the gap between policy intentions and classroom-level implementation.

II. Professional Support Mechanisms

The continuous professional development (CPD) and capacity building of teachers are the main areas of professional support mechanisms. Digital pedagogy-oriented professional development initiatives improve the pedagogical digital competencies of the teachers by integrating technical skills, as well as, digital-specific instructional strategies (Koehler & Mishra, 2009; Lawless & Pellegrino, 2007; Tondeur et al., 2017; Gu et al., 2025). The traits of effective professional development include continued involvement, applicability, the ability to learn together, as well as correspondence to the classroom requirements of teachers (Garet et al., 2001; Avalos, 2011).

Hybrid and flexible model of professional development have also become a major professional support tool, which is now giving a chance to teachers to receive training conveniently and fairly in various institutional settings (Dede et al., 2009; Philipsen et al., 2019; Gu et al., 2025). These programs are frequently accompanied by mentoring, peer work, reflective practice, and digital communities of practice access that will help teachers to grow professionally and innovate (Trust et al., 2016; Desimone, 2009; Ertmer & Ottenbreit-Leftwich, 2010).

Moreover, the studies also show that when teachers have a chance to be agency and participate in curriculum development and the development of digital resources, professional support is enhanced (Tondeur et al., 2017; Cruz & Albuquerque Costa, 2025). Allowing teachers to co-create the digital

learning experience helps teachers to foster a sense of ownership and encourages long-term digital pedagogy utilization (Ertmer & Ottenbreit-Leftwich, 2010; Voogt et al., 2013). Provision of professional support and constant feedback also boosts the confidence of the teachers in incorporating the digital tools in the teaching and learning experiences (Yulin & Danso, 2025; Lawless & Pellegrino, 2007).

III. Integrated Institutional and Professional Support

There are indications that the most effective approach to institutional and professional support mechanisms is an integrated one. The enabling environment of digital pedagogy is achieved through institutional policies that focus on professional development, structured training programs, and continued technical support (Hew & Brush, 2007; Philipsen et al., 2019; Yulin & Danso, 2025). Educators who operate in favourable institutional culture have greater chances of adopting new digital practices and maintaining them in the long run.

On the whole, the literature highlights the idea that the implementation of digital pedagogy is not an individual work of a teacher but a process that should be supported by institutions and professionals working together (Zhao & Frank, 2003; Kozma, 2003). It is necessary to strengthen these support mechanisms in order to promote the teacher readiness, improve the quality of instruction, and secure the effective introduction of digital technologies in education.

4. Strategies for improving teacher readiness and sustaining technology-supported teaching practices in school settings.

This objective aims at coming up with practical measures that will empower teacher readiness and guarantee prolonged application of technology in instruction in schools. Teacher readiness is not just a technical skill but also a pedagogical skill, positive attitudes towards technology, institutional support and lifelong learning (Koehler & Mishra, 2009; Ertmer & Ottenbreit-Leftwich, 2010; Tondeur et al., 2017). It has been shown that educators tend to embrace and maintain technology-based teaching when they are provided with continuous learning programs to match technological tools with lesson objectives and classroom realities (Ertmer & Ottenbreit-Leftwich, 2010; Lawless & Pellegrino, 2007).

Professional development training models that focus on practical experience, learning through collaborative experiences, and reflective practice have been identified to have a considerable positive influence on the confidence and instructional performance of teachers using technology (Tondeur et al., 2017; Trust et al., 2016). Extended, ongoing professional development programs are essential for meaningful incorporation of technology (Garet et al., 2001; Lawless & Pellegrino, 2007; Mane, 2025). Moreover, institutional policies that include mentoring systems, peer support network and access to technical support are very important in maintaining technology integration within the duration of time (Hew & Brush, 2007; Ertmer & Ottenbreit-Leftwich, 2010; Lawless & Pellegrino, 2007).

Another role that is decisive in maintaining technology-supported teaching is also played by school leadership. Practices that are supportive such as fostering experimentation, adequately supplying resources and rewarding new instructional practices are those that help establish a culture in which the use of technology becomes part of the instructional practice rather than a single initiative (Dexter, 2011; Banoğlu et al., 2023). Furthermore, aligning technology integration efforts with teachers' beliefs, classroom needs, and student learning outcomes enhances long-term adoption and reduces resistance to change.

Discussion

The review shows that teacher preparation to digital pedagogy is disproportionate, with the majority of teachers having elementary levels of digital skills but a deficiency of advanced skills needed to prepare

the pedagogical integration (Tondeur et al., 2017; Ertmer, 1999). The lack of pedagogical knowledge has been manifested through the failure to match technology with instructional objectives (Mishra and Koehler, 2006; Ertmer & Ottenbreit-Leftwich, 2010). Moreover, the attitudes and self-efficacy of teachers qualify them to be quite prepared since when affirmative beliefs are embraced, and in cases where none are as sure, resisting will be the case (Ertmer and Ottenbreit-Leftwich, 2010; Inan & Lowther, 2010; Mane, 2025)

The barriers to successful implementation include different barriers, including the digital competence, infrastructure, training, time, and hesitation toward change (Howard et al., 2021; König et al., 2020; Hew & Brush, 2007; Bingimlas, 2009; Pelgrum, 2001). All these render the integration process slow and discourage the long-term use of technology.

However, the presence of the powerful institutional and professional support can help to overcome these issues. Having access to infrastructure, the supportive leadership, and sustained and practice-based professional development support teachers in developing confidence and competence (Kraft et al., 2018; Nielsen et al., 2024; Tondeur et al., 2017; Lawless & Pellegrino, 2007). Lastly, a synergistic approach should be taken to improve the teacher readiness and to sustain digital pedagogy in schools by means of training, resources, and supportive policies (Dexter, 2011; Yulin & Danso, 2025; Trust et al., 2016).

Limitations of the Study

The research has its limitations because it is a secondary source study, not based on primary empirical data, but on a review of the existing literature. As a result, the findings are reflective of trends and patterns that are reported in prior research and may fail to represent context-specific realities in all school contexts. The results will be reliant on the quality and coverage of the studies that were reviewed; the differences in the research design and reporting criteria can affect the quality of the synthesised results.

Conclusion

This review concludes that teacher readiness for digital pedagogy integration in schools is uneven and influenced by multiple interrelated factors. As teachers are becoming more and more attentive to the significance of digital technologies, the absence of advanced digital capabilities, the capability to integrate pedagogy, self-efficacy, and confidence remain key obstacles to successful classroom use. Poor infrastructure, poor professional development, and resistance towards change aggravate these challenges. The findings also highlight that well-developed institutional and professional support systems are necessary to increase teacher readiness and maintain technology-based teaching methods. The access to digital resources, supportive leadership and practice-focused and continuous professional development has a considerable positive influence on the readiness and capacity of teachers to embrace digital pedagogy. Teacher attitudes, beliefs, and openness to innovation are equally important in determining readiness, highlighting the need for support that addresses both skills and motivation. An integrated approach combining institutional policies, leadership, and professional development is essential for sustainable adoption of digital pedagogy. On the whole, it is possible to note that the application of sustainable digital pedagogy needs to be systemic and responds to the current obstacles by reinforcing the coordination of the support provision framework in the school environment.

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