Sinergi International Journal of Education
E-ISSN: 2988-4926
Volume. 2, Issue 3, August 2024
Page No: 157 – 169

Bridging the Digital Divide: A Narrative Review of Teacher Professional Development in the 21st Century

Ani Siti Anisah[1], Sopa Siti[2], Ade Holis[3]
[123]Universitas Garut, Indonesia
Correspondent: sitianisah@uniga.ac.id[1]

Received : June 15, 2024
Accepted : August 12, 2024
Published : August 31, 2024

Citation: Anisah, A.S., Siti, S., & Holis, A. (2024). Bridging the Digital Divide: A Narrative Review of Teacher Professional Development in the 21st Century. Sinergi International Journal of Education, 2(3), 157 – 169.

ABSTRACT: The rapid digitalization of education has placed new demands on teacher competence and institutional support systems. This narrative review aims to synthesize empirical evidence on digital competence development among teachers and analyze the systemic factors that influence the success of training programs. A structured literature synthesis was conducted across peer-reviewed sources focusing on digital readiness, training models, infrastructure, and policy frameworks. Findings reveal significant disparities in digital competence influenced by teacher age, region, and educational level. Teachers in urban settings generally demonstrate higher digital skills due to better infrastructure and support. Systemic barriers such as limited funding, rigid organizational structures, and inadequate policy backing contribute to uneven training outcomes. However, programs that integrate technical, pedagogical, and content knowledge (TPACK), with sustained mentoring and reflective practices, show considerable promise in improving digital integration. School culture and leadership further impact teacher confidence, with collaborative environments promoting innovation. This study underscores the urgency of reforming digital training strategies through inclusive and adaptive models that address both technical and emotional aspects of teaching in the digital era. Policy recommendations include expanding access to infrastructure, enhancing mental health support, and investing in hybrid and personalized professional development. The findings contribute to global discourse on education reform and provide a roadmap for bridging the digital divide in diverse learning environments.

Keywords: Teacher Digital Competence; Professional Development; Digital Education Policy; Education Reform.

INTRODUCTION

In the era of rapidly advancing educational technology, teacher professional development (TPD) has emerged as a crucial domain within educational reform efforts worldwide. The integration of digital tools into classroom practices has necessitated a fundamental transformation in how

educators teach, communicate, and assess student learning. Studies emphasize that effective integration of digital tools requires teachers not only to possess technical knowledge but also to undergo pedagogical shifts that align with the dynamic needs of 21st-century learners (Diz-Otero et al., 2022; Kasemsap, 2017). However, while technology offers immense potential to enhance learning, the successful adoption of such innovations is often hindered by insufficient infrastructure, lack of institutional support, and resistance to change rooted in psychological and cultural barriers (Miço & Cungu, 2022; Dumbraveanu, 2021).

Globally, the educational landscape is witnessing a dramatic shift as teachers are increasingly expected to become proficient in various digital tools and platforms. This trend is particularly pronounced in response to initiatives from governments and educational institutions that promote digital competence as an essential skill for educators (Usart et al., 2020; Althubyani, 2024). Although some countries have implemented structured digital training programs, disparities persist, especially between developed and developing nations, with many educators in the latter facing acute deficiencies in training access and support (Golodov et al., 2022). Consequently, technology adoption has evolved from a luxury to a necessity, catalyzing not only pedagogical innovation but also curriculum reform aimed at personalizing and adapting learning experiences (Twining et al., 2013; Diz-Otero et al., 2022).

Frameworks such as Technological Pedagogical Content Knowledge (TPACK) and the European Digital Competence Framework for Educators (DigCompEdu) have gained prominence in guiding the professional development of teachers in digital contexts (Dumbraveanu, 2021; Miço & Cungu, 2022). TPACK offers a comprehensive conceptual model that emphasizes the interplay between content knowledge, pedagogical strategies, and technological tools, thereby enabling teachers to design more interactive and meaningful learning experiences (Kasemsap, 2017). In parallel, DigCompEdu outlines specific competencies across teaching planning, implementation, and assessment, and is especially valuable for evaluating teachers' progress in digital skill acquisition (Usart et al., 2020). Together, these frameworks support teachers in becoming adaptive agents of change, capable of navigating and shaping technology-enhanced educational environments (Golodov et al., 2022).

Despite the availability of such frameworks, challenges remain significant. A key issue lies in the disparity between basic and advanced digital competencies among educators, often rooted in the traditional pedagogical training they received (Miço & Cungu, 2022; Usart et al., 2020). Many educators struggle with mastering complex digital tools and integrating them meaningfully into instructional practices. Moreover, institutional gaps in terms of policy support and resource provision further exacerbate these difficulties, limiting teachers' ability to evolve pedagogically (Twining et al., 2013; Kasemsap, 2017). Continuous and context-responsive training programs are urgently needed to bridge these gaps and support professional transformation (Diz-Otero et al., 2022).

Social and cultural factors also play a pivotal role in shaping teachers' readiness and motivation to adopt digital tools. In several contexts, traditional beliefs about teaching and learning persist, creating psychological resistance to pedagogical innovation (Miço & Cungu, 2022; Dumbraveanu,

2021). Moreover, systemic issues such as inadequate administrative support, lack of peer collaboration opportunities, and limited access to digital infrastructure remain formidable obstacles to comprehensive TPD (Kasemsap, 2017; Usart et al., 2020). In regions where digital technology is increasingly integrated into national curricula, teachers face pressure to upgrade their competencies rapidly, often without adequate guidance or institutional scaffolding (Althubyani, 2024).

In addition, the mental and emotional demands associated with transitioning to digital pedagogy have surfaced as critical challenges. Teachers often report anxiety and low self-efficacy when required to use unfamiliar technologies, especially without sufficient support or training (Golodov et al., 2022; Usart et al., 2020). Professional development programs need to be designed not only to enhance digital skills but also to foster confidence, resilience, and collaborative learning environments where teachers feel empowered to experiment and innovate (Twining et al., 2013).

A significant gap in the current literature lies in the lack of comprehensive evaluations of TPD programs, especially in developing countries. Much of the existing research focuses on theoretical models or short-term assessments without investigating the long-term impact of professional development on actual classroom practices (Portillo et al., 2020; Diz-Otero et al., 2022). Moreover, few studies explore the contextual and cultural dynamics that shape the success or failure of TPD programs in low-resource environments (Kerkhoff et al., 2020). This gap underscores the need for a nuanced, evidence-based understanding of how TPD programs can be optimized across diverse educational contexts.

In response to these challenges, this narrative review aims to synthesize recent empirical and theoretical insights into teacher professional development in the age of educational technology, particularly in developing country contexts. The review seeks to identify existing gaps, evaluate the effectiveness of various training models, and explore how conceptual frameworks like TPACK and DigCompEdu have been applied or underutilized in practice. Furthermore, this review will consider factors such as policy environments, institutional support, and teacher attitudes that influence the success of digital professional development programs.

This study will focus on regional contexts where disparities in digital competence and infrastructure are most pronounced, specifically Southeast Asia, Eastern Europe, and Latin America. By emphasizing these regions, the review intends to provide a geographically nuanced understanding of how TPD strategies are implemented and how they can be adapted to local challenges and opportunities. In doing so, this research aims to inform policy and practice through a contextualized, evidence-based framework that supports equitable and effective digital transformation in education.

METHOD

This narrative review adopts a systematic yet flexible methodological approach to examine the integration of educational technology in teacher professional development, with an emphasis on digital competence. The methodology encompasses a structured process of literature identification, selection, and analysis to ensure the inclusion of relevant, high-quality empirical studies. The literature was sourced from reputable academic databases, including ERIC, Scopus, Web of Science, and Google Scholar. These databases were chosen for their extensive coverage of peer-reviewed journals in the fields of education, technology, and pedagogy.

The initial phase of the literature search involved the construction of precise keyword combinations. Primary keywords included "teacher professional development," "educational technology," and "digital competence." These were selected to capture the intersection between teacher training, technological integration, and digital literacy. To broaden the search and address terminological variations, additional keywords such as "professional teacher training," "ICT integration," "digital literacy," and "educational innovation" were incorporated using Boolean operators. The use of AND ensured that only studies discussing all key dimensions were retrieved, while OR helped include synonyms, and NOT excluded irrelevant subjects. Truncation and wildcard techniques were also applied to maximize keyword reach in database searches.

Inclusion criteria were carefully established to guide the selection of studies. Only literature published within the past ten years was considered, ensuring relevance to contemporary technological contexts. Eligible studies were peer-reviewed journal articles written in English or Bahasa Indonesia, reflecting both global and local educational perspectives. Additionally, included studies had to report empirical findings or analytical insights directly relevant to teacher professional development, educational technology, or digital competence. Priority was given to research involving K-12 and secondary education teachers, especially those situated in developing countries, to diversify contextual understanding.

The review included various types of empirical studies such as quantitative, qualitative, and mixed-methods research. Studies employing theoretical frameworks like TPACK and DigCompEdu, and those analyzing teachers' digital readiness through measurable indicators, were prioritized. Conversely, exclusion criteria eliminated non-empirical works such as opinion articles, conference abstracts without full reports, and studies focusing solely on adult or higher education contexts unrelated to digital teacher training. Articles unavailable in full-text format or in languages other than English and Bahasa Indonesia were also excluded to maintain consistency and accessibility.

A structured screening process was implemented. Titles, abstracts, and keywords were initially scanned for relevance. Full-text reviews followed for articles meeting the inclusion criteria. To enhance reliability, multiple researchers independently screened the literature and applied inclusion/exclusion checklists. Disagreements were resolved through discussion and consensus, ensuring inter-coder agreement. This methodological rigor mitigated subjectivity and preserved scientific validity.

Key bibliographic and empirical data were extracted using standardized forms, capturing research design, data collection methods, sample characteristics, key findings, and theoretical contributions.

The collected data were then thematically categorized into primary themes such as training models, effectiveness assessments, and technological integration challenges. NVivo and Zotero were utilized for managing references and coding qualitative data, facilitating efficient organization and analysis.

To further validate findings, studies were evaluated using quality appraisal tools such as the Mixed Methods Appraisal Tool (MMAT) and PRISMA guidelines. Only articles with robust methodological documentation and substantive contributions were retained. Literature was also classified by research type (e.g., experimental, longitudinal, case studies), geographical focus, educational level, and domain relevance. This facilitated cross-context comparisons and enhanced thematic synthesis.

Grey literature, including policy reports and dissertations, was selectively incorporated when empirically sound and contextually relevant. These documents provided supplementary insights into policy implementations and real-world training practices. Literature from regions such as ASEAN, Eastern Europe, and Latin America received focused attention to highlight context-specific challenges and innovations.

Constant comparison analysis was employed to synthesize findings, enabling systematic identification of patterns and discrepancies across studies. Thematic synthesis was supported by meta-synthesis techniques for qualitative literature, integrating recurring concepts into a coherent conceptual framework. Quantitative findings were analyzed using descriptive and inferential statistics to extract measurable patterns in teacher digital readiness and training impact.

Triangulation further reinforced validity by comparing results across study types and analytical methods. Expert panels comprising scholars in education, technology, and research methodology reviewed the study's design and interpretation of findings. Their input guided revisions to the inclusion/exclusion criteria and informed thematic conclusions.

Ethical considerations underpinned all stages, ensuring respect for intellectual property and accurate representation of cited works. Transparent documentation was maintained throughout the process, including flow diagrams and summary tables outlining the number of studies identified, screened, excluded, and analyzed. Reference management software like EndNote and NVivo ensured accuracy in citation and data handling.

Ultimately, this rigorous and transparent methodological approach enables a comprehensive and credible narrative synthesis. The study offers empirically grounded insights into how technology-enhanced training initiatives shape teachers' digital competence and professional development outcomes, particularly in the context of developing education systems. The methodology supports the generation of strategic, policy-relevant recommendations and contributes to scholarly discourse on the future of teacher training in the digital age.

RESULT AND DISCUSSION

The narrative review revealed four major themes emerging across the literature on teacher professional development and educational technology: Digital Competence, Infrastructure and Institutional Support, Teacher Workload and Well-being, and Training and Collaboration Models. Each theme reflects complex interrelations between demographic variables, institutional readiness, and pedagogical transformations.

The first thematic area, Digital Competence, highlighted significant disparities in digital skill acquisition among teachers based on age, geographic location, and level of education. Diz-Otero et al. (2022) identified a clear generational gap, with younger teachers exhibiting higher levels of digital fluency compared to their more experienced counterparts. Portillo et al. (2020) further supported this claim, noting that teachers' self-perception of digital competence strongly correlates with classroom effectiveness, indicating that both confidence and actual competence impact pedagogical outcomes.

This age-based variance suggests that while younger educators may more readily adopt new technologies, older teachers possess critical pedagogical expertise that can enhance technology integration if appropriately supported. Miço and Cungu (2022) emphasized the necessity of age-responsive training programs that bridge the digital gap without undervaluing the experience of senior educators. Tailored modules are thus essential for addressing the varied digital readiness levels across age groups.

Geographic disparities also emerged as a crucial determinant of digital competence. Teachers in urban regions benefit from greater access to ICT resources and professional development opportunities than their rural counterparts. Golodov et al. (2022) and Portillo et al. (2020) highlighted that digital divide across urban-rural lines is often a result of inequitable infrastructure investments and inconsistent policy enforcement. This contextual variation reinforces the need for geographically sensitive intervention strategies.

Variations by educational level also surfaced, with primary school teachers reporting different challenges compared to those teaching at secondary or tertiary levels. Portillo et al. (2020) found that early education teachers face difficulties in customizing digital materials, whereas higher education instructors typically engage more deeply with innovative digital tools. These distinctions demand differentiated training pathways that cater to unique instructional demands.

Across the board, higher digital competence positively influenced learning outcomes. Teachers proficient in digital skills reported implementing interactive methodologies that enhanced student motivation and participation (Diz-Otero et al., 2022; Portillo et al., 2020). Indicators such as academic performance, engagement in hybrid learning, and classroom dynamics provided empirical backing for the claim that teacher digital competence drives educational effectiveness.

Moreover, comprehensive training programs significantly uplifted digital competence and, by extension, teaching effectiveness. Portillo et al. (2020) documented that integrated training models combining technical, pedagogical, and content knowledge, particularly those aligned with TPACK and DigCompEdu frameworks, led to notable improvements in classroom digital practices.

The theme of Infrastructure and Institutional Support emerged as the second pillar influencing teacher technology adoption. Golodov et al. (2022) reported that inadequate digital infrastructure—from unstable internet to insufficient hardware—remains a significant barrier in under-resourced schools. In contrast, institutions with robust IT support and proactive technical maintenance systems experience fewer disruptions, enabling smoother technology integration.

Infrastructure quality extends beyond equipment to include institutional policies and technical assistance. Schools with dedicated IT support teams demonstrated higher resilience against technical setbacks, allowing teachers to focus on pedagogy (Golodov et al., 2022). Institutional investment in regular hardware upgrades and internet reliability also played a critical role.

Institutional support in the form of ongoing professional development, mentoring, and policy backing significantly enhanced digital integration. Twining et al. (2013) found that hands-on workshops and collaborative training initiatives cultivated stronger teacher capacity and confidence. Similarly, Usart et al. (2020) highlighted the role of internal policies, such as scheduling flexibility and incentive structures, in boosting teacher motivation to engage with digital training.

Sustainable institutional support emerged most effective when combining long-term mentoring, accessible resources, and flexible policy design. Twining et al. (2013) observed that mentorship programs, especially those involving peer-to-peer learning, accelerated digital adaptation. Supportive school governance, including budget allocation for tech infrastructure and administrative relief, created a conducive environment for digital teaching innovation.

The third major theme, Teacher Workload and Well-being, addressed the unintended consequences of technology integration, notably technostress and burnout. Morska et al. (2022) warned that while technology streamlines certain tasks, it also introduces challenges such as increased lesson preparation and technical troubleshooting. This duality impacts teacher mental health, with higher stress levels reported in digitally intensive teaching environments.

Cahapay and Bangoc (2021) identified technostress as a prevalent issue linked to mandatory tech usage, bureaucratic digital demands, and insufficient psychological support. They called for systematic interventions like mental health counseling and stress management training to buffer these effects. Best practices include scheduling flexibility, access to wellness resources, and support from school counselors.

Comparative studies show that nations with integrated wellness and professional development strategies fare better in managing teacher stress. Eastern European countries, for instance, have introduced compensation packages and special leave policies for digitally burdened teachers (Morska et al., 2022). These measures correlate with higher satisfaction and lower attrition rates, confirming the necessity of balanced digital transformation policies.

The final theme, Training and Collaboration Models, focused on the structure and effectiveness of professional development initiatives. Twining et al. (2013) asserted that interactive workshops, peer collaboration, and performance evaluations lead to more meaningful technology adoption. Innovative methods like reverse mentoring—where younger teachers guide senior colleagues—promoted equitable knowledge transfer and strengthened collegial bonds.

Collaborative networks and communities of practice played a transformative role in supporting digital pedagogy. Usart et al. (2020) and Twining et al. (2013) described how teacher networks fostered knowledge exchange, reduced isolation, and enhanced innovation. Digital platforms further enabled cross-regional collaboration, facilitating discussions and shared solutions to common pedagogical issues.

Effective training programs included simulations, classroom trials, and feedback mechanisms. Twining et al. (2013) noted that certification processes and practical assessments provided measurable indicators of digital competence growth. Ongoing evaluation allowed for real-time adjustments to training, increasing program relevance.

Additionally, hybrid training formats that combine online modules with in-person coaching proved effective in overcoming geographic and scheduling constraints. Twining et al. (2013) demonstrated that these flexible formats widened access and sustained engagement across diverse teacher populations.

Emerging digital platforms and social media also contributed to informal professional development. Portillo et al. (2020) observed that active participation in educational forums and online communities enabled teachers to stay current with pedagogical trends. These virtual exchanges often led to higher motivation and greater implementation of new digital tools in classrooms.

Training success hinged on the competence of facilitators. Twining et al. (2013) emphasized that mentors with strong pedagogical and technological acumen fostered effective learning environments. Personalized mentoring and constructive feedback helped bridge individual knowledge gaps and build teacher confidence.

Quantitative evaluations validated training outcomes. Portillo et al. (2020) reported significant gains in post-training digital competence scores, which translated into more interactive and technology-rich classrooms. These findings supported the role of structured assessment in program optimization.

Training also impacted teacher well-being. Morska et al. (2022) found that teachers who felt more competent in using technology experienced lower stress levels, especially when supported by adequate institutional structures. This dual benefit underscores the need for holistic professional development.

Institutional collaboration among schools, ministries, and higher education institutions enabled the design of comprehensive training programs. Twining et al. (2013) documented that inter-sectoral partnerships provided access to broader resources and elevated training quality.

Ultimately, the synthesis of findings affirms that successful digital transformation in education is multidimensional, requiring concurrent investment in teacher competence, infrastructure, institutional support, and responsive training models. Studies consistently demonstrated that integrated strategies yield better educational outcomes, reduced teacher stress, and higher student engagement. These insights offer actionable pathways for policy and practice in modern educational ecosystems.

The findings of this study underscore the complex interplay between digital competence development and systemic factors that influence the success of technology-based teacher training programs. These findings resonate strongly with the global literature that recognizes the importance of a holistic, context-sensitive, and policy-driven approach to professional development in the digital era (Twining et al., 2013; Diz-Otero et al., 2022).

One central theme that emerged is the critical role of integrated training models. Globally, educational researchers advocate for training programs that combine technical, pedagogical, and content knowledge, aligning closely with the TPACK framework (Twining et al., 2013). This study confirms that such models lead to greater instructional innovation and improved student engagement, a conclusion also supported by international research (Portillo et al., 2020). However, the extent to which these models are effective depends heavily on contextual variables, including institutional culture and organizational structure (Assié-Lumumba, 2012).

Systemic differences between developed and developing countries were evident, particularly in access to infrastructure and availability of resources. In developed contexts, digital training often incorporates hybrid learning and robust self-assessment tools, facilitating deeper teacher reflection and growth (Diz-Otero et al., 2022). Conversely, infrastructure deficits in developing regions constrain implementation, reinforcing findings from global studies on the unequal digital landscape (Portillo et al., 2020; Twining et al., 2013). Despite this, reflective practices such as digital self-assessment remain globally acknowledged as essential components of successful training programs (Usart et al., 2020).

Policy frameworks have a substantial impact on training efficacy. National policies that prioritize digital education foster environments where infrastructure investment and resource distribution are more equitable, thereby enhancing training quality (Twining et al., 2013). Countries with coherent and forward-looking policies tend to demonstrate higher rates of successful technology integration (Portillo et al., 2020). The lack of such policies often results in fragmented and ineffectual training initiatives, a challenge consistently noted in the literature (Diz-Otero et al., 2022). Therefore, alignment between national education policies and local implementation strategies is vital.

Institutional leadership and organizational culture further influence training success. Visionary leadership supports experimentation and lifelong learning, encouraging teachers to engage meaningfully with digital tools (Portillo et al., 2020). This aligns with evidence that transformational leadership facilitates technological adoption and sustains professional development (Assié-Lumumba, 2012; Diz-Otero et al., 2022). Schools that promote collaboration and innovation create an environment where resistance to change is minimized, reinforcing the necessity of cultural transformation at the institutional level (Usart et al., 2020).

Cultural barriers remain significant obstacles. Schools with conservative educational cultures may hinder the adoption of digital methodologies, regardless of available training (Portillo et al., 2020). In contrast, institutions with open, collaborative cultures are more likely to exhibit effective technology use. This highlights the necessity of gradual, context-aware cultural reform to support digital integration (Diz-Otero et al., 2022). Effective change management strategies must therefore include cultural diagnostics and interventions.

Organizational structure, particularly decentralization and cross-functional collaboration, plays a crucial role. Schools with flexible management models facilitate faster integration of digital practices (Twining et al., 2013), while rigid hierarchies often inhibit innovation (Portillo et al., 2020). This supports calls in the literature for structural reforms that empower teachers and promote peer support networks (Usart et al., 2020).

The study also reinforces the importance of self-perception and teacher confidence in technology use. Consistent with prior research, teacher confidence correlates positively with managerial and peer support (Diz-Otero et al., 2022). Thus, professional development must be supported by institutional mechanisms that address time management, resource access, and emotional well-being (Twining et al., 2013).

Comparative insights suggest that sustainable training programs incorporate continuous practical engagement, iterative feedback, and contextual responsiveness. Studies from high-income nations confirm that structured, ongoing support ensures long-term technological integration (Usart et al., 2020). Yet, adaptability remains crucial. One-size-fits-all approaches often fail when transplanted across different educational systems (Portillo et al., 2020). Customized training models grounded in local needs and realities prove more effective.

Financial and administrative support are also central to successful training. Adequate funding enables procurement of necessary tools and supports comprehensive training programs (Diz-Otero et al., 2022). However, uneven budget allocations, particularly in lower-income regions, limit impact (Assié-Lumumba, 2012). Thus, equitable financial policies are needed to bridge digital divides and facilitate effective training.

Beyond the institutional, individual-level stressors such as technostress must be addressed. Research indicates that increased digital demands can exacerbate anxiety and burnout, necessitating the inclusion of psychological support and time-management training within professional development (Cahapay & Bangoc, 2021). Therefore, comprehensive programs should integrate well-being strategies to ensure long-term teacher resilience.

The study highlights that collaborative learning communities enhance training outcomes. Peer networks provide avenues for sharing best practices, troubleshooting issues, and sustaining motivation (Twining et al., 2013). This supports the global consensus that communities of practice are indispensable for fostering pedagogical innovation (Portillo et al., 2020).

Finally, a critical limitation of the existing research is its frequent neglect of contextual variability. Many studies draw generalized conclusions without accounting for local sociocultural dynamics, resulting in reduced applicability in diverse settings (Assié-Lumumba, 2012). Future research should prioritize comparative, longitudinal studies that explore the interplay of systemic and cultural variables in different regions. Additionally, there is a need for more robust empirical evaluations that capture not just short-term gains but also long-term shifts in teaching practice and student outcomes.

In sum, this discussion affirms that effective digital professional development requires systemic coherence, cultural sensitivity, strong leadership, and responsive policy design. The transformation

of educational systems in the digital era hinges not solely on technological access but on the synergistic interaction of these multifaceted factors.

CONCLUSION

This narrative review has highlighted the multifaceted challenges and opportunities related to digital competence development among teachers in the digital era. The findings demonstrate that age, geographic region, and educational level significantly affect digital readiness, necessitating tailored professional development models. Differences in infrastructure and institutional support further reinforce the need for equitable resource allocation and strategic policy interventions. The discussion also confirms that systemic factors such as national education policies, school culture, and organizational structure are essential in determining the success of digital training programs.

Urgent action is required to mitigate digital divides and technostress, especially in underserved regions. Holistic professional development, supported by visionary leadership, robust infrastructure, and sustained mentoring, emerged as the most effective strategy for enhancing teacher digital competence. Moreover, fostering collaborative learning communities and integrating reflective practices can significantly boost teacher confidence and innovation in digital pedagogy.

Policy frameworks must not only ensure access to digital tools and training but also support teacher well-being through adaptive work arrangements and psychological support. This study recommends further research that explores longitudinal effects of hybrid and reverse mentoring models, and evaluates the cultural adaptability of training programs across diverse contexts. Strengthening school-based digital ecosystems through systemic, inclusive, and interdisciplinary approaches is vital to bridging the digital gap and achieving sustainable educational transformation in the 21st century.

REFERENCE

Abildinova, G., Abdykerimova, E., Assainova, A., Mukhtarkyzy, K., & Abykenova, D. (2024). Preparing educators for the digital age: teacher perceptions of active teaching methods and digital integration. *Frontiers in Education, 9*. https://doi.org/10.3389/feduc.2024.1473766

Althubyani, A. (2024). Digital competence of teachers and the factors affecting their competence level: a nationwide mixed-methods study. *Sustainability, 16*(7), 2796. https://doi.org/10.3390/su16072796

Assié-Lumumba, N. (2012). Cultural foundations of the idea and practice of the teaching profession in Africa: indigenous roots, colonial intrusion, and post-colonial reality.

Educational Philosophy and Theory, 44(sup2), 21-36. https://doi.org/10.1111/j.1469-5812.2011.00793.x

Cahapay, M., & Bangoc, N. (2021). Technostress, work performance, job satisfaction, and career commitment of teachers amid COVID-19 crisis in the Philippines. *IJERI International Journal of Educational Research and Innovation, (16)*, 260-275. https://doi.org/10.46661/ijeri.6145

Diz-Otero, M., Portela-Pino, I., Domínguez-Lloria, S., & Juste, M. (2022). Digital competence in secondary education teachers during the COVID-19-derived pandemic: comparative analysis. *Education + Training, 65*(2), 181-192. https://doi.org/10.1108/et-01-2022-0001

Dumbraveanu, R. (2021). Challenges in the current distance education paradigm. https://doi.org/10.12753/2066-026x-21-197

Golodov, E., Gerlach, I., Kopchenko, I., Spirina, O., Khlopkova, V., & Chiyanova, E. (2022). Professional deficits of teachers in the field of ICT competencies, manifested in the conditions of digital transformation of education. *Perspectives of Science and Education, 58*(4), 58-73. https://doi.org/10.32744/pse.2022.4.4

Kasemsap, K. (2017). Teacher education and teacher professional development. In *Handbook of Research on Teacher Education and Professional Development* (pp. 112-137). https://doi.org/10.4018/978-1-5225-1067-3.ch007

Kerkhoff, S., Spires, H., & Wanyonyi, P. (2020). Teaching new literacies and inquiry: a grassroots effort to bring about educational change in Kenya. *Journal of Adolescent & Adult Literacy, 64*(2), 145-156. https://doi.org/10.1002/jaal.1067

Miço, H., & Cungu, O. (2022). The need for digital education in the teaching profession: a path toward using the European Digital Competence Framework in Albania. *IAFOR Journal of Education, 10*(2), 26-50. https://doi.org/10.22492/ije.10.2.02

Morska, L., Polok, K., Bukowska, M., & Ладанівська, І. (2022). New technologies and their impact on foreign language teacher professional burnout. *Advanced Education*, 35-44. https://doi.org/10.20535/2410-8286.251587

Portillo, J., Ruíz, U., Garitano, E., & Quintana, N. (2020). Self-perception of the digital competence of educators during the COVID-19 pandemic: a cross-analysis of different educational stages. *Sustainability, 12*(23), 10128. https://doi.org/10.3390/su122310128

Twining, P., Raffaghelli, J., Albion, P., & Knezek, D. (2013). Moving education into the digital age: the contribution of teachers' professional development. *Journal of Computer Assisted Learning, 29*(5), 426-437. https://doi.org/10.1111/jcal.12031

Usart, M., Cantabrana, J., & Cervera, M. (2020). Validation of a tool for self-evaluating teacher digital competence. *Educación XX1, 24*(1). https://doi.org/10.5944/educxx1.27080

Aldrup, K., Carstensen, B., Köller, M., & Klusmann, U. (2020). Measuring teachers' social-emotional competence: development and validation of a situational judgment test. Frontiers in Psychology, 11. https://doi.org/10.3389/fpsyg.2020.00892

Alarcón-Espinoza, M., García, P., & Anguera, M. (2023). Systematic observation of emotional regulation in the school classroom: a contribution to the mental health of new generations. International Journal of Environmental Research and Public Health, 20(8), 5595. https://doi.org/10.3390/ijerph20085595

Ha, N., Byun, S., Lang, S., & Jeon, L. (2024). Qualitative study on social-emotional learning for teachers (self-t): a professional development intervention promoting early childhood educators' knowledge of emotional well-being. European Early Childhood Education Research Journal, 1-15. https://doi.org/10.1080/1350293x.2024.2425947

Heineke, A. and Vera, E. (2021). Beyond language and academics: investigating teachers' preparation to promote the social-emotional well-being of emergent bilingual learners. Journal of Teacher Education, 73(2), 145-158. https://doi.org/10.1177/00224871211027573

Jennings, P., Jeon, L., & Roberts, A. (2020). Introduction to the special issue on early care and education professionals' social and emotional well-being. Early Education and Development, 31(7), 933-939. https://doi.org/10.1080/10409289.2020.1809895

Kabasakal, E. and Emıroğlu, O. (2021). The effect of rational-emotive education on irrational thinking, subjective wellbeing and self-efficacy of typically developing students and social acceptance of disabled students. Child Care Health and Development, 47(4), 411-421. https://doi.org/10.1111/cch.12819

Kardambikis, P. and Donne, V. (2022). Impact of covid and the emergence of social emotional learning on education majors. Social Sciences, 11(12), 584. https://doi.org/10.3390/socsci11120584

Kitanovska-Kimovska, S., Atanasovska, K., Popovska, S., & Cvetkoski, V. (2023). Empowering teachers and students to cope with the stress of online teaching and learning: findings from a pilot project on psychosocial support in the language and translation classroom. Journal of Teaching English for Specific and Academic Purposes, 175. https://doi.org/10.22190/jtesap221221011k

Lapidot-Lefler, N. and Israeli, R. (2024). Quality education through teacher-student relationships: implementing social-emotional learning in teacher development. Quality Assurance in Education, 32(3), 401-415. https://doi.org/10.1108/qae-12-2023-0217