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Digital Competence, Artificial Intelligence Integration, and Teacher Wellbeing in Malaysia: A Review

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Abstract

The rapid digitalisation of education and the accelerated integration of artificial intelligence (AI) technologies have transformed the professional landscape of teachers in Malaysia. While digital tools and AI-driven systems offer substantial pedagogical benefits, they also present new challenges that influence teachers' workload, professional identity, and overall psychological wellbeing. This review synthesises recent empirical literature from 2020 to 2025 to examine the relationship between digital competence, AI literacy, and teacher wellbeing in the Malaysian context. The findings demonstrate that digital competence enhances teacher autonomy and reduces stress, whereas inadequate training, excessive digital workload, and anxieties surrounding AI adoption contribute to declining wellbeing. The review concludes that systematic digital professional development, ethical AI governance, and supportive school environments are essential to safeguard teachers' wellbeing and ensure sustainable digital transformation in education.

Keywords: Teacher Wellbeing, Digital Competence, Artificial Intelligence, Education

Introduction

The educational landscape in Malaysia has undergone rapid and far-reaching transformation due to the global shift toward digitalisation and the increasing integration of artificial intelligence (AI) in teaching and learning. This transformation is important because digital and AI technologies are no longer optional innovations but core components of contemporary education systems that directly shape teaching effectiveness and learning quality. This transformation intensified after the COVID-19 pandemic, which accelerated nationwide adoption of digital platforms and reshaped teachers' pedagogical practices. The introduction of Malaysia's Digital Education Policy (DEP) in 2023 further institutionalised these shifts by mandating digital integration and encouraging the use of emerging technologies across instructional settings. Although these reforms aim to enhance educational quality, flexibility, and global competitiveness, their success depends heavily on

teachers' ability to engage effectively with digital and AI-based tools, which places increasing demands on teachers to develop new competencies within limited time frames (Ahmad & Rathakrishnan, 2025).

The increasing integration of AI, ranging from automated assessment systems and adaptive learning platforms to analytics dashboards and generative AI tools, adds an additional layer of cognitive, emotional, and professional demands. Studying this area is therefore necessary because AI adoption reshapes not only instructional practices but also teachers' professional roles and decision-making responsibilities. International evidence indicates that the pace of AI-related change often exceeds teachers' readiness, producing uncertainty, anxiety, and concerns about professional identity (Wang et al., 2023; Saboor et al., 2024). Similar trends have been observed among Malaysian teachers, who express both optimism about AI's potential and apprehension due to insufficient training, ethical ambiguities, and unclear expectations (Ahmad & Rathakrishnan, 2025; Omar & Mohmad, 2023). These mixed responses highlight the need to better understand how AI integration affects teachers in practical and psychological terms, particularly in developing education systems.

Historically, teacher wellbeing has been shaped by factors such as workload, classroom demands, emotional labour, and administrative responsibilities. However, the digital era introduces new determinants including digital competence, AI literacy, digital workload, and technostress that interact with traditional stressors. This shift makes the study of digital and AI-related factors essential, as teacher wellbeing directly influences instructional quality, student engagement, and long-term workforce sustainability. Empirical studies indicate that teachers with higher digital competence experience stronger self-efficacy, enhanced job satisfaction, and lower psychological distress (Maftei et al., 2023; Nurgaliyeva et al., 2023). Conversely, insufficient digital skills, rapid platform changes, and heightened digital documentation requirements contribute to exhaustion, anxiety, and burnout (Yang & Du, 2024). Without systematic understanding and intervention, these pressures may undermine both teacher effectiveness and educational reform outcomes.

This review synthesises emerging research to analyse how digital competence, AI literacy, digital workload, and institutional support shape teacher wellbeing in Malaysia. The significance of this review lies in its practical utility for multiple stakeholders. For policymakers, it provides evidence to support balanced digital education strategies that prioritise teacher wellbeing alongside innovation. For school leaders and administrators, it highlights organisational conditions and support mechanisms that can enhance teacher readiness and reduce digital stress. For teacher educators and professional development providers, it identifies critical competency areas where targeted training can improve both effectiveness and resilience. By consolidating national and international evidence, this review contributes to a more sustainable and human-centred approach to digital and AI integration in Malaysian education.

Literature Review

Digital Competence and Teacher Wellbeing

Digital competence has become an increasingly important aspect of teachers' professional practice in Malaysia, especially as the education system moves toward more

digitally enhanced and AI supported learning environments. Although Malaysian research directly linking digital competence to teacher wellbeing is still limited, existing empirical studies offer meaningful insights into how digital skills, readiness, and organisational support shape teachers' professional experiences.

Recent studies show that Malaysian teachers generally demonstrate moderate to high levels of digital competence, particularly in digital pedagogy, ICT use, and online teaching readiness. Omar et al. (2023) found that secondary school teachers display strong digital competency practices, influenced by pedagogical strategies, ICT proficiency, and preparedness for online instruction. Aziz (2023) similarly reported that digitalised management practices improve teachers' perceived digital fluency and administrative competence. These findings indicate that well designed digital systems can strengthen teachers' confidence, efficiency, and sense of professional autonomy.

Despite these positive trends, teachers continue to face challenges in more advanced areas of digital competence. Tasks involving digital security, troubleshooting, and the integration of emerging technologies remain difficult for many teachers. These challenges are often linked to uneven training opportunities, limited technical support, and differences in school resources across regions. Such gaps have implications for teacher wellbeing because low digital competence can increase anxiety, create additional workload stress, and contribute to feelings of inadequacy.

Although digital competence has not yet been a central variable in Malaysian wellbeing research, related studies offer useful context. Zulkifli et al. (2022) identified resilience, job satisfaction, emotional intelligence, and coping strategies as key determinants of teacher wellbeing. While digital competence was not directly measured, the authors noted that professional challenges, including the need to adapt to new expectations, influence overall wellbeing. When considered alongside research documenting teachers' digital anxiety and platform related stress, these findings suggest that stronger digital competence may indirectly support wellbeing by reducing uncertainty and reinforcing teachers' confidence in managing digital tasks.

School leadership also plays an important role in shaping teachers' digital experiences. Studies show that principals' digital leadership is positively associated with teachers' digital competence. Hamzah et al. (2021) and Abdullah and Kadir (2023) found that leaders who model effective digital practices, provide clear direction, and build supportive digital cultures contribute to higher levels of teacher confidence and engagement with instructional technologies. Such leadership can help reduce ambiguity and create a psychologically supportive environment that promotes teacher wellbeing.

Overall, current Malaysian research suggests that digital competence is becoming an essential component of effective teaching. Although direct evidence linking digital competence to wellbeing is still emerging, existing findings indicate that strengthening teachers' digital skills can help reduce digital stressors and enhance confidence, autonomy, and job satisfaction. As digital transformation continues in Malaysian schools, further research is needed to explore how digital competence may function as a protective factor for teacher wellbeing.

AI Literacy, Professional Identity, and Emerging Pressures

The rapid integration of artificial intelligence (AI) into Malaysian educational environments is reshaping teachers' work in profound ways, influencing not only pedagogical practices but also professional identity, autonomy, and emotional wellbeing. Although empirical studies explicitly linking AI literacy to wellbeing remain limited in Malaysia, emerging research provides important insights into how teachers navigate these technological shifts.

Recent evidence suggests that Malaysian teachers and university students possess relatively high levels of AI literacy, supported by expanding national digital infrastructure and institutional emphasis on AI readiness (Mansoor et al., 2024). However, this foundational awareness does not necessarily translate into deep pedagogical application, ethical understanding, or sustained professional development. Scholars argue that although AI knowledge is growing, Malaysian teachers require more targeted, practice-oriented training to integrate AI meaningfully into instruction and to adapt confidently to rapid technological changes (Sperling et al., 2024; Walter, 2024).

Leadership emerges as a significant determinant of teachers' attitudes toward AI. Visionary AI leadership—characterised by clear digital strategies, ethical guidelines, and structured support—has been shown to motivate teachers to experiment with AI tools, enhance feedback systems, and cultivate a culture of innovation (Tang et al., 2025). However, such leadership must also foreground responsible, balanced, and human-centred AI use to preserve teachers' professional agency and psychological security.

AI integration is also reshaping teachers' professional identity. As AI-enabled systems increasingly facilitate assessment, analytics, content delivery, and administrative tasks, teachers are required to expand their roles to include technological integration, data interpretation, and ethical decision-making. Malaysian findings indicate that while teachers recognise AI's potential to elevate instructional quality, many express concerns about over-dependence on automated systems and the erosion of relational elements central to teaching (Ramalingam & Maniam, 2024). These tensions echo global research showing that AI can both enhance and complicate teacher identity depending on implementation practices and perceived autonomy (Ghamrawi et al., 2024).

Alongside these identity-related shifts, Malaysian educators face emerging pressures that contribute to digital stress. Teachers increasingly report the need for continuous upskilling to keep pace with evolving AI tools, raising concerns about workload intensification and cognitive fatigue (Ahmad & Rathakrishnan, 2025). Ethical dilemmas related to data privacy, algorithmic bias, student surveillance, and transparency further exacerbate emotional strain. Additionally, digital divides—particularly in resource-limited schools—result in unequal access to AI tools and professional development, deepening disparities in readiness and confidence (Zainudin et al., 2025).

Collectively, the literature suggests that Malaysian teachers are entering an era in which AI literacy, professional identity, and emerging digital pressures are increasingly intertwined. While teachers demonstrate growing motivation and awareness of AI's benefits, the rapid pace of technological change demands sustained leadership, structured

professional development, and policy frameworks that emphasise ethical, equitable, and psychologically safe AI integration. These conditions are essential not only for effective AI adoption but also for safeguarding teachers' wellbeing and preserving values-based professional identities in the age of AI.

Digital Workload and Technostress

The rapid digitalisation of Malaysian education, especially after the COVID-19 pandemic, has significantly increased teachers' digital workload and contributed to rising levels of technostress. In addition to teaching, teachers are now expected to manage learning management systems, conduct online assessments, complete digital reporting, adapt to frequent platform changes, and respond to technology-based communication outside normal working hours. This additional digital labour has blurred the boundary between work and personal life and has contributed to emotional strain and reduced wellbeing.

Research in Malaysia consistently reports high levels of technostress among teachers. Wahab et al. (2022) found that secondary school teachers experienced substantial technostress during the pandemic, with similar levels across gender and school types, indicating that digital strain is widespread. More recent evidence from Ram et al. (2025) shows that technostress, especially related to techno overload and techno invasion, decreases primary school teachers' wellbeing by lowering job satisfaction, increasing emotional fatigue, and disrupting work life balance. Studies in higher education also show that technostress contributes to work overload, feelings of job insecurity, and physical health complaints (Decataldo & Fiore, 2022: Wang & Li, 2019).

Several forms of technostress are particularly relevant in Malaysia. Techno overload and techno complexity are major contributors to stress when teachers must work faster, manage multiple digital tools at once, or handle complicated technologies without sufficient training. These challenges are more serious in rural areas where infrastructure and technical support are limited. Yassin et al. (2025) found that these stressors significantly reduced job performance among teachers, demonstrating how digital demands can disproportionately burden teachers in resource-constrained settings.

Techno insecurity and techno uncertainty also contribute to stress. These occur when teachers fear being replaced by technology, worry about rapid technological changes, or feel unsure about using unfamiliar digital systems. Although most studies associate these factors with negative outcomes, Hassan et al. (2019) reported an unexpected finding. In their study, techno insecurity and techno uncertainty were positively related to organisational commitment. This suggests that under strong institutional guidance, some teachers may feel more motivated to meet digital expectations, although this area needs further investigation.

International research strengthens the understanding of these trends. Li and Wang (2021) found that technostress can be reduced when teachers receive involvement facilitation, technical support, and opportunities to participate in technology-related decisions. A scientometric review by Li et al. (2024) also showed that global research on technostress increased sharply after 2020, indicating that technostress is now a long-term concern rather than a temporary pandemic issue. Conceptual work by Haixu and Ismail (2025) further highlights that continuous training, clear digital workload policies, and user-centric

technology design are important strategies for reducing technostress and protecting teacher wellbeing.

Overall, the literature shows that digital workload and technostress are major and ongoing challenges in Malaysian education. Senior teachers, individuals with lower digital skills, and those working in rural schools appear especially vulnerable, although technostress affects teachers across all demographic groups. Schools and education authorities must therefore prioritise clear digital procedures, provide accessible technical support, and involve teachers in decisions about technology use. Without these supports, technostress will continue to undermine teacher wellbeing, reduce instructional quality, and hinder Malaysia's digital education goals.

Supportive School Environments and Professional Development

Supportive school environments are widely recognised as essential for developing teachers' digital and AI related competencies. Drawing on self-determination theory, recent studies argue that when schools provide learning support, autonomy, and a psychologically safe climate, teachers' digital competence develops more effectively. Chiu et al. (2024) found that school learning support enhances digital competence partly by fulfilling teachers' needs for competence, autonomy, and relatedness. These psychological needs form the foundation for motivation and sustained engagement in digital practices.

In Malaysia, school leadership has consistently been identified as a central factor shaping teachers' digital readiness. Research in secondary schools across Selangor and Klang reports that principals' technology leadership, digital citizenship, and commitment to digital transformation are positively associated with teachers' ICT utilisation and digital competence (Ghavifekr & Wong, 2022; Abdullah & Kadir, 2023). Leaders who model digital engagement, provide clear strategic direction, and cultivate collaborative digital cultures create conditions that allow teachers to experiment with technology and apply it confidently in the classroom. By reducing uncertainty and strengthening professional trust, such leadership indirectly supports teacher wellbeing.

School administrators in Malaysia are increasingly aware of the potential of AI for teaching and management. However, their own AI knowledge and competence vary considerably, which affects how effectively AI is embedded into school culture. Ramalingam and Maniam (2024) note that although administrators show interest in AI trends, many still require training to implement AI technologies strategically and ethically. A recent study from Kedah found that when schools had strong digital policies and investments in technological infrastructure, most teachers achieved satisfactory levels of technology use in teaching (Ahmad & Rathakrishnan, 2025). This highlights the importance of institutional support in translating national digital aspirations into classroom practice.

Professional development represents a second major pillar supporting teachers' adaptation to digital and AI related technologies. Regional and international research emphasises that the most effective professional development is continuous, hands-on, collaborative, and aligned with authentic classroom needs. Professional development programmes that focus on AI have been shown to significantly improve teachers' AI

knowledge, skills, and attitudes, which increases their confidence in integrating AI tools into instruction (Kitcharoen et al., 2024).

Intervention studies further demonstrate that AI assisted professional development can strengthen teachers' autonomy in using technology, reduce digital burnout, and enhance higher order thinking (Duan & Zhao, 2024; Lu et al., 2024; Yang, 2024). AI powered learning facilitators and digital platforms used during professional development also enhance satisfaction by improving lesson design quality and pedagogical content knowledge. However, these technologies simultaneously reveal existing gaps in digital skills, which must be addressed systematically.

Despite progress, several challenges persist in Malaysia. Unequal access to AI related training, inconsistent support across schools, and gaps in AI literacy mean that readiness varies widely across the teaching profession (Jamaluddin et al., 2025; Tan et al., 2024). Systematic reviews highlight that much AI in education research prioritises student outcomes rather than teacher development, indicating a need for more empirical work on how AI can be used for teacher learning and wellbeing (Tan et al., 2025: Al Zyoud, 2020).

Promising directions include international collaborative dialogues and online partnerships between Malaysian and Australian pre service teachers, which broaden perspectives and strengthen digital and intercultural competencies (Maniam et al., 2025). These competencies are increasingly important in AI mediated educational environments.

Taken together, the literature demonstrates that supportive school environments, strong digital leadership, and well-designed professional development programmes are essential for cultivating teachers' digital and AI competencies. These institutional supports contribute not only to technological readiness but also to greater professional confidence, adaptability, and wellbeing.

Methodology

This review was conducted using a structured narrative approach to identify and synthesise recent studies related to digital competence, AI literacy, and teacher wellbeing in Malaysia. The methodological procedures used were aligned with standard practices in educational review studies, similar to the approach adopted in previous Malaysian wellbeing research

Relevant literature was searched systematically using major academic databases, including Scopus, ScienceDirect, ERIC, SpringerLink, and Google Scholar. These databases were chosen because they provide extensive coverage of peer-reviewed publications in education, psychology, and technology integration. The search focused on studies published between 2020 and 2025 to capture current developments following the rapid digitalisation of education.

A combination of keywords was used such as teacher wellbeing, digital competence, digital skills, AI literacy, artificial intelligence in education, technostress, digital workload, and Malaysia. Boolean operators (AND, OR) were applied to ensure relevant and comprehensive retrieval of studies.

To determine the suitability of the articles, the following inclusion criteria were applied:
a) studies conducted on teachers in Malaysia or in educational settings with similar technological contexts;
b) publications between 2020 and 2025;
c) empirical research of wellbeing, digital competence, AI literacy, or digital-related stress; and
d) studies situated within school or educational environments.

Articles were excluded if they:
a) did not involve teachers as the main sample; or
b) focused only on student outcomes without examining teacher wellbeing.

The initial search yielded a large number of studies. After screening titles and abstracts, full texts were reviewed to ensure relevance A total of more than thirty empirical studies met the inclusion criteria and were included in the final synthesis. This number aligns with the typical scope of Malaysian wellbeing reviews, which often involve focused sets of empirical articles due to the emerging nature of the field.

Each selected study was analysed in depth, focusing on its objectives, methodology, sample, main findings, and relevance to teacher wellbeing. A thematic analysis was then conducted to identify major trends across the literature. Studies were grouped under core themes such as digital competence, AI literacy, digital workload, technostress, and institutional support. This process allowed for a clearer understanding of how digitalisation and AI integration shape teacher wellbeing within Malaysian schools.

Discussion and Conclusion

This review illustrates the complex and interconnected relationships among digital competence, AI literacy, digital workload, technostress, and teacher wellbeing in the Malaysian educational landscape. As schools increasingly adopt digital tools and AI supported systems, teachers are positioned at the center of these transformations. The synthesis of Malaysian and international literature reveals both opportunities and challenges emerging from this shift.

The first major finding concerns the foundational role of digital competence. Malaysian teachers generally demonstrate moderate to high levels of digital readiness, particularly in ICT use, digital pedagogy, and online teaching (Omar & Mohmad, 2023; Aziz, 2023). Teachers who possess stronger digital skills report greater confidence, improved job satisfaction, and enhanced instructional flexibility, which are all associated with positive wellbeing outcomes (Maftei et al., 2023; Nurgaliyeva et al., 2023). However, persistent gaps in digital security, troubleshooting, and advanced integration highlight inequities in access and support, particularly between urban and rural schools. These gaps are not merely technical. They carry psychological implications because inadequate digital competence can heighten anxiety, increase workload stress, and reduce perceived professional efficacy. Although Malaysian wellbeing research has not yet extensively examined digital competence as a wellbeing determinant (Zulkifli et al., 2022), evidence from digital anxiety and platform related stress suggests that competence may serve as an important protective factor.

A second key finding concerns AI literacy and its influence on teachers' professional identity. Malaysian teachers and preservice teachers show increasing awareness of AI, yet this knowledge is often not accompanied by deep pedagogical application or ethical reasoning (Mansoor et al., 2024; Sperling et al., 2024). As AI tools begin to support tasks such as assessment, analytics, and content delivery, teachers are required to expand their roles to include technological integration, data interpretation, and ethical decision making. While teachers recognise AI's potential to enhance learning, many express concerns about the erosion of human interaction and the risk of over reliance on automated systems (Ramalingam & Maniam, 2024). These concerns reflect global findings that AI reshapes professional identity in ways that may empower or constrain teachers depending on institutional framing and leadership support (Ghamrawi et al., 2024). Strong AI leadership, such as clear guidelines, ethical frameworks, and strategic planning, can foster positive attitudes and preserve agency (Tang et al., 2025). Without such support, AI related uncertainty may contribute to cognitive load and emotional strain.

The third major finding relates to technostress and digital workload. Malaysian studies provide consistent evidence that technostress is widespread and significantly affects wellbeing (Wahab et al., 2022; Ram et al., 2025). Techno overload, techno complexity, and techno invasion are especially prominent stressors. These stressors reduce job satisfaction, disrupt work life balance, and weaken emotional health. Teachers in rural and resource constrained contexts experience compounded challenges due to limited infrastructure and inadequate technical support (Yassin et al., 2025). International studies support these findings and further suggest that targeted interventions, such as involvement facilitation and accessible technical support, can significantly reduce technostress (Li & Wang, 2021; Li et al., 2024). Without systemic intervention, digital workload threatens instructional quality and long term teacher retention.

Finally, the review highlights the critical role of supportive school environments and professional development. Digital leadership at the school level has been repeatedly shown to influence teachers' digital competence and ICT utilisation (Ghavifekr & Wong, 2022; Abdullah & Kadir, 2023). When leaders model technology use, provide clear expectations, and cultivate a supportive climate, teachers feel more confident and motivated to engage with digital tools. Professional development also plays a central role. Research shows that continuous, hands on, and practice oriented professional development improves AI skills, enhances self-efficacy, reduces burnout, and supports sustained digital integration (Kitcharoen et al., 2024; Duan & Zhao, 2024; Yang, 2024). However, Malaysian teachers still experience uneven access to AI related training due to school level differences and resource disparities (Jamaluddin et al., 2025). There is also a shortage of empirical work on how AI can support teacher learning and wellbeing, as much AI research still prioritises student outcomes (Tan et al., 2024; Al Zyoud, 2020).

Taken together, the literature indicates that teachers in Malaysia are navigating a period of intense technological transformation. Digital competence, AI literacy, technostress, and institutional support are deeply intertwined variables that collectively shape teachers' professional experiences. Strengthening teacher wellbeing in the digital era therefore requires a holistic approach that addresses technical skills, emotional support, ethical guidance, and organisational structures.

Future policy efforts should prioritise equitable access to digital tools and training, the development of robust AI governance frameworks, and professional development that is continuous and contextually relevant. Ensuring that teachers are adequately supported in navigating digital and AI related change is essential for fostering positive wellbeing, maintaining instructional quality, and sustaining the long term success of Malaysia's digital transformation in education.

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