Analysis of Teachers' Readiness to Use Digital Literacy in the Teaching and Learning Process

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DOI: https://doi.org/10.47772/IJRISS.2026.101000499

Received: 08 October 2026; Accepted: 13 October 2026; Published: 06 November 2026

ABSTRACT

The rising digitalization of education has raised the demand for teachers to develop not only operational digital abilities, but also the ability to incorporate technology meaningfully into teaching and learning (T&L). This study investigates teachers' digital preparation, attitudes, perceived impediments, and patterns of digital technology use in Malaysian schools, with a focus on the gap between digital preparedness and pedagogical integration. A quantitative descriptive case study design was used, with 50 teachers from various educational institutions and geographical situations in Malaysia. A systematic questionnaire was used to collect data on instructors' willingness to use digital technology, hurdles to technology integration, attitudes and motivation, and frequency of usage of digital apps. The data show that teachers displayed a high level of digital preparedness, with an overall mean score of 4.33. Teachers showed great trust in using digital devices (M = 4.70) and a strong belief that technology improves T&L effectiveness (M = 4.52). Attitudes and motivation for digital technology were equally strong (M = 4.22). However, perceived barriers remained modest overall (M = 2.97), with inadequate internet access (M = 3.80) and a lack of ongoing professional training (M = 3.70) cited as the most significant obstacles. A significant gap in technology-use patterns was noted, with communication programs such as WhatsApp and Telegram being regularly utilized (M = 4.80), whereas interactive collaborative tools such as Padlet, Jamboard, and Mentimeter were infrequently used. The findings indicate that digital preparation alone is insufficient to enable effective pedagogical integration. Sustainable digital transformation necessitates dependable infrastructure, ongoing professional development, and a stronger emphasis on interactive and student-centered digital pedagogy.

Keywords: teacher digital preparedness, digital literacy, technology integration, digital pedagogy, and professional development

INTRODUCTION

Teaching and learning in the digital age requires digital literacy. Teachers who master technology, information literacy, ICT, and digital media may use digital resources successfully (Rozali et al., 2024). Digitally literate teachers can optimize student engagement (Spiteri & Rundgren, 2018). Due to institutional support and equipment constraints, classroom ICT deployment is minimal despite this rising requirement (Muda et al., 2025). Limited training and change resistance persist (Sanders, 2025), emphasizing the need for professional growth. Misalignment between technology tools, curricula, and pedagogical instruction hinders digital strategy adoption (Ibrahim & Husnin, 2025) (Chama & Subaveerapandiyan, 2023). Technology integration skills also affect teaching ability. Younger teachers adapt faster, yet others are tech-phobic, insecure, or unskilled. Education must innovate through collaborative learning for mature digital literacy (Swandi et al., 2026).

Most Malaysian instructors realize the importance of digital literacy but lack confidence in incorporating it into their T&L activities, according to Sulaiman et al. (2023). Teachers' digital preparation depends on leadership and institutional assistance. To help instructors improve student learning, comprehensive professional development programs must cover technology pedagogical topics (Rofiah et al., 2024). According to Yap et al. (2024) found that rural Malaysian teachers struggle more with digital technologies than metropolitan teachers. Limited technology infrastructure, support, and time to research new technologies. Continuous digital literacy

training tailored to teachers increases digital competences, according to Ithnain and Saidin (2021). Zaim et al. (2024) also found that informal learning and collaborative professional online communities are necessary for digital skill integration into daily teaching. The technology Pedagogical Content Knowledge framework and other programs go beyond basic skill development to combine technology instruments with instructional methods and content objectives.

Digital literacy encompasses online source evaluation, critical thinking, and tech ethics (Geng, 2021). Learning to use, comprehend, evaluate, and create valuable digital content in education is digital literacy. Mastam et al. (2024) advised teachers to employ digital tools and evaluate their suitability for learning objectives. Urban and rural teachers' digital literacy levels range despite various digital education policies, including the Digital Education Policy. Lack of ICT, digital devices, and internet access inhibits technology-based T&L for rural teachers(Nadarajan, Malathy & Abdul Karim, Noorhuda & Saro, Noraini & Anuar, Nur. (2024).

Teachers appreciate the importance of technology in T&L, but a lack of continual training and professional development has made them less confident in incorporating technology (Maharani et al., 2023). Educational digital transition is also hindered by uncertainty and technology resistance, especially among experienced teachers (Park & Yoon, 2023). Othman, Din, and Ishak (2025) found that many teachers struggled with technology-based teaching, especially during the pandemic's home-based schooling. Beyond these localized challenges, sustainable digital transformation requires educators to comprehend digital social responsibility, including legal compliance, ethical behavior, copyright, and data security threats (Feng & Sumettikoon, 2024).

Lack of school-wide digital culture plans and technological leadership hinders implementation (Lo & Alias, 2025). Nur Maslina Mastam et al. (2024) remarked that government activities have been constrained by a lack of empirical research on teachers' Sociocultural elements such student backgrounds and digital learning facilities affect T&L digital literacy (Andriyani et al., 2023). Thus, to address the urban-rural technical infrastructure gap, a more complex policy framework must emphasize equitable resource allocation and targeted professional development (Amalia, 2026; Hamilaturroyya & Adibah, 2025). Without thorough data-driven teacher digital literacy assessments, implementation may fail. An in-depth study is needed to assess teacher readiness and develop treatments (Begimbetova et al., 2024). Such research should establish standardized yet adaptive evaluation frameworks since no single model fits all educational environment goals (Nguyen & Habók, 2023). Thus, assessing teachers' digital literacy is essential to modernizing national education. This study should assist Malaysian educators improve digital literacy policies and training.

LITERATURE REVIEW

The prior research on the usage of teachers' online literacy in T&L is discussed in this part. To guarantee they were relevant to the modern educational circumstances notably after COVID-19 where education systems had integrated digital technology, studies from 2020 to 2024 were reviewed. ICT has transformed education across the world. This shift has pushed Malaysian teachers to embrace digital T&L methods and emphasized the need for online literacy (Ahmad & Alias, 2020; Jalil & Moi, 2023). Online literacy consists of abilities in devices and software, digital ethics, critical thinking, information management, and pedagogy (Maghfiroh, Djalal, & Masrukan, 2023). The modern education system stresses that instructors must be knowledgeable in these areas to curate, develop, and convey valid knowledge in a diverse educational setting (Maharani et al., 2023).

Classroom technology implementation, teacher preparation and online literacy are still concerns (Dhawan, 2020; Hizam et al., 2021). Administrative help, professional training, and teachers' technology attitudes also play a role in the integration of digital teaching and learning (Mohamad & Yusof, 2021; Nurhikmah et al., 2024). The application of online literacy in schools is also believed to be enhanced by institutional support, digital professional learning communities and inclusive pedagogical approaches (Che Nidzam et al., 2022; Rusli & Kheng, 2025). Thus, previous research may be categorized into four major themes: teachers' digital literacy level, digital T&L preparation, challenges and barriers of digital technology, and suggestions for improving the use of digital technology in education. The previous studies provide a theoretical and practical basis for understanding teacher electronic literacy and support for the current investigation. This study highlights the need for comprehensive assessment indicators for digital security and ethics to ensure that the instructional approach meets contemporary safety criteria (Mazman et al., 2025).

Success in education technology hinges on teachers' readiness to implement digital instruction. Ahmad and Alias (2020) explored online teacher preparedness within the framework of COVID-19. The study found that teachers schooled in technology felt more confident. However, many teachers struggled with challenges and stress due to a lack of skills and resources during the unanticipated transition.

In UNESCO (2021) assessment on Digital Readiness in Southeast Asia, Malaysian teachers were moderately digitally ready. Significant investment nevertheless, access and training and pedagogical inflexibility remained important problems. Nurhikmah et al. (2024) found that self-perceived digital literacy level, pedagogical expertise, attitudes toward technology, infrastructure, and management support predicted instructors' readiness for online learning. One of the largest indicators for positive teacher attitudes was shown to be preparation. Many teachers have mastered basic operations but there are deficiencies in advanced skills including data protection, digital security and collaborative communication (Tzafilkou et al., 2023).

Maghfiroh et al. (2023) confirmed these results by assessing the teachers' digital competency using DigCompEdu. They discovered very few respondents attained C1 competency, and none reached C2. There is a lot of opportunity for improvement. According to SEAMEO Voctech (2022), training on digital classroom management and Learning Management System (LMS) platform improved the instructors' readiness to provide virtual T&L notably during the pandemic.

There are many problems for instructors with digital technology in the classroom. According to Mohamad and Yusof (2021), notable challenges include poor infrastructure, irregular access to the internet, a lack of continuous ICT training, and a lack of administrative support. Teachers bad attitudes about technology may also be a barrier to T&L technology adoption. Aside from these institutional challenges, the rapid shift to virtual settings revealed that many instructors had difficulty adapting their teaching methods to online platforms (Omar & Mohmad, 2023). Shafie et al. (2023) investigated the teaching concerns of COVID-19 and identified numerous issues.

The report found issues with technology, expertise of digital pedagogy and student access to devices and the Internet. Again Hashim & Shaari (2020) found that flipped learning increased the student understanding. This approach will work if teachers can adapt to technology and provide students with adequate feedback.

Social media posts, such as on Reddit (2022), indicated that parents and instructors were concerned that poor and intermittent internet connections may interfere with online T&L. This indicates continuing worries about digital infrastructure, especially in some locations. The rise of blended learning requires that teachers adapt classes to students' access to digital resources.

This illustrates that technology aided T&L needs appropriate design and infrastructure. Research indicates that the conflict between pedagogical approaches and the technical capabilities of Learning Management Systems prevents the enhancement of educational workflow (Haibao, 2025). Shortages of hardware and power outages make it difficult to integrate digital devices and exacerbate operational inefficiencies (Celeste & Osias, 2024).

METHODOLOGY

This study employed a descriptive case study design using a quantitative approach. The study aimed to analyse teachers' readiness to use digital literacy during the T&L process. This approach enabled the researchers to obtain comprehensive data through questionnaires.The respondents consisted of school teachers from several schools and educational institutions in Malaysia, including SMK Agama Mohamad Ali Ranau, Sabah; SMK Mohd Khalid, Johor Bahru, Johor; Akademi Haiwan Malaysia; and Maahad Al Mashoor Al Islami, Penang. Participants were selected using purposive sampling based on several criteria. These included having at least one year of teaching experience, being directly involved in T&L activities involving digital tools or platforms and being willing to participate in the study by completing the questionnaire. This approach enabled the study to obtain responses from teachers across different locations in Malaysia rather than focusing exclusively on a particular state.

RESULT AND DISCUSSION

Demographic Analysis of Respondents

Table 1: Demographic Profile of Respondents

Demographic Profile	Category	Frequency (f)	Percentage (%)
Gender	Male	18	36
	Female	32	64
Age	< 30 years	10	20
	31–40 years	18	36
	41–50 years	15	30
	> 50 years	7	14
Teaching Experience	< 5 years	8	16
	6–10 years	12	24
	11–15 years	16	32
	> 15 years	14	28
Educational Qualification	Bachelor's Degree	36	72
	Master's Degree	12	24
	PhD	2	4
Teaching Specialisation	Science/Mathematics	20	40
	Languages	15	30
	Humanities/Social Sciences	10	20
	Technical/Vocational	5	10

Table 1 shows the demographics of 50 diverse teachers. Most respondents (64.0%) were female, while 36.0% were male. This distribution shows Malaysia's high female teacher representation. According to age, the largest group of teachers was 31–40 years old (36.0%), followed by 41–50 years old (30.0%), 20–30 years old (20.0%), and 50 years old (14.0%). The responders were of various ages, with many in their mid-career stages. The largest group had 11–15 years of teaching experience (32.0%), followed by more than 15 (28.0%), 6–10 (24.0%), and fewer than five (16.0%). This suggests that the respondents were experienced teachers with classroom technology and instructional approaches. Most teachers have a bachelor's degree (72.0%), followed by a master's (24.0%) and a PhD (4.0%). This distribution matches the minimal academic credentials for teaching, which are bachelor's degrees. Science and Mathematics instructors made up the largest category (40.0%), followed by Language (30.0%), Humanities and Social Sciences (20.0%), and Technical and Vocational (10.0%). This distribution shows that respondents came from varied academic fields, providing a broader view of instructors' digital literacy preparation in T&L.The results showed that most respondents had school internet access. Only 2.0% of respondents said one teacher lacked school internet connection. The demographic analysis shows that the study included teachers of various genders, ages, teaching experiences, academic qualifications, and specializations. This diversity helps assess teachers' digital literacy readiness in school-based T&L.

Analysis of Frequency of Digital Application Use

Table 5: Frequency of Digital Application Use

Item	Statement	Mean	Level
F6	Communication applications (WhatsApp/Telegram)	4.8	Very Frequent

F2	PowerPoint/Canva/Prezi	4.4	Frequent
F5	Collaborative applications (Padlet/Jamboard/Mentimeter)	2.7	Rare
Overall		**3.93**	**High**

Table 5 indicates that teachers used digital applications at a high level, with an overall mean of 3.93. Communication applications such as WhatsApp and Telegram were used most frequently (mean = 4.80), while presentation and instructional-material development applications such as PowerPoint, Canva, and Prezi were also widely used (mean = 4.40). However, interactive collaborative applications such as Padlet, Jamboard, and Mentimeter were used less frequently (mean = 2.70).

This finding suggests that teachers tend to favor basic, accessible, and user-friendly applications, whereas collaborative applications with greater potential to enhance student engagement have not yet been fully explored. This discrepancy may be attributed to a lack of technical proficiency or confidence in facilitating complex, multi-user digital environments, as research often indicates that teachers require targeted guidance to move beyond passive information delivery toward active, cooperative learning (Dejacto & Baluyos, 2026), (Oguguo et al., 2023).Consequently, Malaysian research likewise suggests that teachers need practical experience with Web 2.0 tools and stronger ICT literacy to translate positive attitudes into interactive, pedagogically purposeful classroom use (Rashid et al., 2021; Sailin & Mahmor, 2018). Furthermore, because teachers frequently utilize messaging platforms for asynchronous lessons due to their ease of access and low data requirements, these tools could be leveraged as a foundational bridge toward introducing more advanced interactive digital resources (Ishak et al., 2022). By strategically scaffolding the integration of interactive quiz and file-sharing platforms tools often cited as effective for increasing student engagement, educators can overcome the initial learning curve associated with more complex collaborative software (Yani, 2021).

Descriptive Analysis of Teachers' Readiness to Use Digital Literacy in T&L

Table 2: Descriptive Analysis of Teachers' Readiness to Use Digital Literacy in T&L

Item	Statement	Mean	Level
B1	Confident in using digital devices	4.7	High
B7	Technology enhances T&L effectiveness	4.52	High
B6	Integration of technology into daily T&L	4.1	High
B9	Receive support from the school	4.3	High
Overall		**4.33**	**High**

Table 2 shows that teachers' readiness to use digital literacy was at a high level, with an overall mean of 4.33. The highest score was recorded for teachers' confidence in handling digital devices (mean = 4.70), followed by their belief that technology improves the effectiveness of T&L (mean = 4.52). However, the mean scores for technology integration into daily T&L (mean = 4.10) and school support (mean = 4.30) were slightly lower.

These findings indicate that teachers already possess basic digital skills and demonstrate a high level of readiness to use technology. However, the effectiveness of technology integration remains dependent on organizational support.

Therefore, although teachers are confident in their own capabilities, school support in terms of planning, supervision, infrastructure, and resources needs to be strengthened to ensure optimal technology integration. Furthermore, future professional development initiatives should prioritize pedagogical training that bridges the gap between individual technical proficiency and the practical, day-to-day application of digital resources in the classroom. Such targeted training could empower educators to move beyond surface-level device usage toward more transformative, student-centered digital teaching strategies.

By addressing these specific pedagogical requirements, educational institutions can foster a more cohesive environment that sustains long-term digital adoption. In the Malaysian context, further literature review could

examine how professional development and institutional support help translate teachers' digital confidence into pedagogically meaningful classroom practice (Nasir et al., 2024). This alignment is critical, as high levels of ICT competence do not inherently guarantee successful pedagogical integration (Baharuldin et al., 2020).

Descriptive Analysis of Teachers' Attitudes and Motivation

Table 3: Descriptive Analysis of Teachers' Attitudes and Motivation

Item	Statement	Mean	Level
D2	Believe technology increases student motivation	4.6	High
D1	Excited to use new technologies	4.58	High
D4	Feel burdened when preparing digital T&L materials	3.1	Moderate
Overall		**4.22**	**High**

Table 4 demonstrates that teachers had positive attitudes and high motivation towards the use of digital technology, with an overall mean of 4.22. Teachers believed that technology could increase student motivation (mean = 4.60) and expressed enthusiasm for trying new technologies (mean = 4.58). However, some teachers reported feeling burdened when preparing digital T&L materials (mean = 3.10). This finding indicates that teachers' attitudes towards technology are highly positive, but workload-related issues need to be addressed. Teacher motivation can serve as an important catalyst for effective technology integration in T&L, if teachers receive appropriate support in terms of time, workload management, training, and resources. Moreover, mitigating these administrative burdens is essential to prevent the erosion of teacher enthusiasm, as unbureaucratic, readily accessible technical support has been shown to significantly bolster both performance and professional confidence (Wohlfart et al., 2021).

Descriptive Analysis of Issues and Barriers in the Use of Digital Literacy

Table 3: Descriptive Analysis of Issues and Barriers in the Use of Digital Literacy

Item	Statement	Mean	Level
C2	Poor internet connectivity	3.8	High
C5	Lack of continuous training	3.7	High
C8	Negative attitudes among colleagues	2.7	Low
C6	Lack of support from school leadership	2.8	Low
Overall		**2.97**	**Moderate**

Table 3 indicates that the overall level of challenges was moderate, with a mean score of 2.97. The most prominent challenges were poor internet connectivity (mean = 3.80) and a lack of continuous training (mean = 3.70). In contrast, challenges related to colleagues' attitudes (mean = 2.70) and school leadership support (mean = 2.80) were relatively low.

This suggests that teachers experience greater technical difficulties than problems related to attitudes or workplace culture. The effectiveness of digital T&L depends substantially on the quality of infrastructure and the availability of continuous training rather than solely on teachers' willingness to use technology. These findings demonstrate that schools and educational authorities should place greater emphasis on technical support and basic facilities, as these factors represent important barriers to the successful implementation of digital technology in classrooms.

Additionally, addressing these persistent technical deficits is essential to prevent teacher burnout and disillusionment, which can arise when instructional ambitions are consistently thwarted by substandard digital tools. Furthermore, policy initiatives should prioritize the systematic upgrading of broadband infrastructure and the implementation of structured, long-term professional development programs to mitigate these operational constraints (Saravanan & Kamrozzaman, 2025). This recommendation is consistent with

Malaysian research linking unreliable internet access and limited technical support to difficulties in integrating technology into classroom teaching, highlighting the importance of dependable infrastructure that allows teachers to focus on student-centred instruction (Ismail et al., 2022; Razak et al., 2019). Such systemic improvements are critical, as prior research indicates that insufficient access to functional hardware and training remains a primary inhibitor to effective digital classroom engagement (Soekamto et al., 2022).

DISCUSSION

Teachers were highly prepared for online literacy, with a mean of 4.33. This means teachers are adept in digital knowledge and confident in using various digital devices and programs in T&L. This study matches Hussin, Ab Jalil, and Manap (2019), who reported Malaysian secondary school teachers had good digital literacy. Ahmad and Alias (2020) found that teachers get more confident in digital education throughout the COVID-19 pandemic.

Thus, teachers are better at using technology to teach. Teachers generally prefer basic content delivery to advanced student collaboration, even when they feel ready (Bergdahl & Bond, 2021; Cabellos et al., 2023). This gap shows that online literacy includes cognitive and social skills as well as the ability to use digital devices to create interactive, student-centered learning environments (Erita et al., 2026).

Teachers were well-prepared but faced modest problems (mean = 2.97). Infrastructure constraints, unreliable internet connectivity, and lack of training were the key difficulties. Technical assistance and school leadership encouragement also influenced technology inclusion at lower levels. According to Mohamad and Yusof (2021), technical and infrastructural issues, not instructors' attitudes, are the biggest obstacles to digital T&L adoption. Nurhikmah, Idris, and Maulana (2024) found that digital teaching was hindered by a lack of CPD.

This shows that even with good teacher preparation, infrastructure and professional development largely impact digital technology effectiveness in T&L. Institutions must provide ongoing pedagogical training and institutional resources to bridge the gap between theoretical readiness and classroom practice (Yulin & Danso, 2025).

This is supported by instructor attitude and motivation findings. The mean of 4.22 indicates that teachers like technology and want to use new digital tools. In their positive attitude toward technology use (mean = 4.60) and desire to use new technologies (mean = 4.58), instructors demonstrate psychological readiness. The moderate score for feeling burdened by digital T&L materials (mean=3.10) suggests that workload may limit instructors' ability to change their positive attitudes toward sustainable digital behaviors. Thus, professional development programs should emphasize technical expertise, time management, instructional design, resource sharing, and burden reduction.

The fundamental adoption of technology and its greater pedagogical integration in digital application utilization are also far off. WhatsApp and Telegram were most popular (mean = 4.80). Prezi, Canva, and PowerPoint were most popular (mean = 4.40). Padlet, Jamboard, and Mentimeter averaged 2.70, much lower. This shows that teachers prefer simple apps over interactive technology that requires more pedagogical planning. Future training should include how to choose and integrate interactive technology to promote collaboration, critical thinking, active learning, and student participation.

Schools may demystify sophisticated tools and lower the apparent entry barrier to increasingly complex collaborative spaces by creating communities of practice where educators can exchange effective pedagogical approaches. This purposeful shift toward collaborative integration requires us to regard technology as an architectural element of student-centered inquiry rather than just a content delivery tool.

The survey found that Malaysian instructors are ready for digital education. Teacher technology adoption is strong due to their preparedness, positive attitudes, and frequent use of simple digital applications. The data also demonstrates that digital integration requires more than preparation. Infrastructure, internet access, professional development, workload, and creative collaborative application testing are priorities. Thus, educational policymakers and school leaders must develop a strategy that includes infrastructure upgrading,

ongoing training, technological support, and pedagogical guidance. This method would help teachers move beyond marginal technology to more meaningful, interactive, and effective digital learning.

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