

The Level of Digital Technology Usage in Teaching and Learning among SJKC Teachers in Air Itam District

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Abstract

This research aims to examine the level of digital technology integration in teaching and learning among Sekolah Jenis Kebangsaan Cina (SJKC) teachers in Air Itam district. It seeks to evaluate their readiness in utilizing digital tools and identify potential barriers hindering effective adoption. The research contributes to the broader discourse on digital education by providing localized insights into Sekolah Jenis Kebangsaan Cina (SJKC) teachers' experiences. Recommendations include targeted training programs, improved infrastructure and policy adjustments to foster equitable technology adoption in vernacular schools. The integration of digital technology in education has become a critical factor in enhancing teaching and learning effectiveness, particularly in the 21st-century classroom. With the rapid advancement of digital tools such as interactive platforms, AI-driven learning systems and online collaborative resources, educators worldwide are expected to adapt to these innovations to improve student engagement and learning outcomes. In Malaysia, the emphasis on digital transformation in education, as outlined in the *Malaysia Education Blueprint 2013-2025*, highlights the necessity for teachers to incorporate technology into their pedagogical practices. This study focuses on **Sekolah Jenis Kebangsaan Cina (SJKC) teachers in Air Itam district**, a group that has received limited attention in existing research on digital integration. Given the unique challenges faced by vernacular schools including resource allocation, teacher readiness and infrastructure limitations. It is essential to assess how effectively these educators are adopting digital tools. Understanding their level of technology integration will not only reveal gaps in implementation but also provide insights into how policy interventions and professional development programs can be tailored to support **Sekolah Jenis Kebangsaan Cina (SJKC) teachers**.

Keywords: Digital Technology, Teaching and Learning, SJKC Teachers, Technology Integration, Air ITAM

Introduction

The integration of digital technology into education has transformed traditional teaching methods by providing more interactive and engaging learning experiences. However, the extent of the adoption varies across different school types and regions. This study focuses among Chinese National-Type Schools (SJKC) in Air Itam district, exploring how teachers utilize digital tools in their classrooms.

In modern era of education, digital technology plays a crucial role in the enhancing effectiveness of the teaching and learning processes. The use of the technologies such as learning applications, smart devices, and online platforms provides opportunities for more interactive, engaging and relevant learning experiences aligned with 21st-century advancements.

Digital technology in 21st-century education has been widely adopted among educators due to its ability to enhance the quality of the teaching and learning. The integration on hypermedia elements such as animation, sound, graphics, hypertext and colour make presentations more engaging and capable of capturing students' interest (Maimun et al., 2011). Additionally, digital-based learning is more effective and suitable for implementation in education, as it facilitates the explanation of complex concepts (Azizi et al., 2009).

For teachers in Chinese National-Type Schools (SJKC), their role in leveraging digital technology becomes even more significant. This is because traditional teaching approaches often need to be adapted to meet current educational demands. In Malaysia, various initiatives have been introduced, such as the Malaysia Education Development Plan (PPPM) 2013-2025, which about the need to integrate technology into teaching. Although Air Itam district is an urban area with access to various technological facilities, the extent to which digital technology is effectively utilized into teaching and learning remains unclear.

This transformation involves the application of technology into learning including the control of hardware, internet networks and online learning platforms to enhance students' digital skills and teachers' digital competencies. The purpose of digital transformation in education is to enhance students' learning experiences (Graham et al., 2023), prepare them for the demands of an increasingly digital world of work (McCarthy et al., 2023) and empower the digital, cognitive, social and emotional skills needed in the 21st century (Alenezi et al., 2023). This transformation also enables more innovative, collaborative and personalized learning approaches. This step ensures that education can keep up with technological developments and the changing needs of society. So indirectly, digital transformation in education is to create a relevant, responsive learning environment and prepare students for an increasingly digitally connected in future.

This research aims to evaluate the extent of digital technology usage in teaching and learning among teachers in Chinese National-Type Schools (SJKC) in Air Itam district. As well as identify the challenges and factors influencing its implementation.

Literature Review*Digital Competence In Malaysian Primary Education*

Digital competence is one of the crucial aspects of educational development that needs to be systematically nurtured. In 2023, the Ministry of Education Malaysia implemented a digital competency screening test among educators. This initiative demonstrates the ministry's commitment to assessing teachers' knowledge and skills in applying technology in education.

Furthermore, the Ministry of Education Malaysia has launched the Learning Management System (SiPP) platform. This platform aims to enhance the digital competency of educators by providing them access to training materials, courses, and learning resources, both online and offline, through their respective devices. This initiative clearly signifies the ministry's effort to improve the current learning environment towards digital education, aligning with the demands of the modern job market (Tushar & Sooraksa, 2023).

Such efforts are essential to ensure that the current generation not only possesses the ability to use technology but also becomes ethical digital users.

High-quality digital competence is a crucial skill for teachers (Haleem et al., 2022; Sailer et al., 2021; Stumbrienė et al., 2024). However, the question remains whether teachers in Malaysia are prepared and possess sufficient digital competence to meet the nation's aspirations for quality digital education.

Findings from previous studies on primary and secondary school teachers by Irfan Naufal and Amat Sazali (2015) indicate that the level of technology integration in teaching remains low. Additionally, some studies claim that Malaysian schoolteachers only possess basic technological knowledge, primarily limited to using internet applications for accessing information and basic communication purposes (Hidayu et al., 2021; Irfan Naufal & Mohamad Tarmizi, 2014; Moses & Wong, 2022; Radin & Yasin, 2018). These studies reveal that a significant number of teachers have yet to master advanced digital skills, such as graphic design, animation, and multimedia development.

This clearly illustrates that the adoption of digital technology among Malaysian teachers remains limited, despite various initiatives being implemented.

Digital Technology Adoption in Malaysian Education

This integration of digital technology in Malaysian educational has gained momentum driven by the government's emphasis on 21st-century learning through initiatives like Malaysia Education Blueprint 2013-2025. (Ministry of Education, 2013). However, disparities exist in adoption levels across school types, including Chinese National-Type Schools (SJKC). This review examines digital technology adoption patterns, challenges and the role of teacher competency in Malaysian primary education.

Digital technology in education has become a critical factor in the enhancing teaching and learning effectiveness, particularly in 21st century. Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006) provides a comprehensive model for understand how teachers effectively integrate technology with pedagogy and content knowledge to improve instructional practices. However, the extent to which teachers in

Chinese National-Type Schools (SJKC) in Malaysia utilize digital technology within this framework remains an area requiring further exploration.

Studies indicate that while digital tools such as interactive multimedia, online platforms and smart devices offer significant potential in education (Maimun et al., 2011; Azizi et al., 2009), many Malaysian teachers still struggle with effective implementation. Research by Naufal and Sazali (2015) found that technology integration in primary and secondary schools remains low with teachers often limited to basic digital applications for communication and information retrieval rather than advanced pedagogical uses (Hidayu et al., 2021; Moses & Wong, 2022). This suggests a gap in **digital competence**, particularly in applying technology to subject-specific teaching strategies.

Technological Pedagogical Content Knowledge (TPACK) model emphasizes intersection of Technological Knowledge (TK), Pedagogical Knowledge (PK) and Content Knowledge (CK). In the context of SJKC, where Mandarin is the primary medium of instruction, teachers face unique challenges in adapting digital tools to language and cultural-specific content. A study by Radin and Yasin (2018) found that while some teachers are proficient in basic digital literacy. Many lack the skills to integrate multimedia, simulations or data-driven tools into their lessons effectively.

Furthermore, SJKC teachers must navigate national education policies, such as the Malaysia Education Blueprint (PPPM) 2013-2025, which promotes digital learning but does not always account for the specific needs of vernacular schools. Research by Lee and Wong (2020) highlights that SJKC teachers often rely on traditional teaching methods due to insufficient training in technology-enhanced pedagogy, affecting their TPACK development.

There are several barriers hinder the effective adoption of the TPACK framework among SJKC teachers. Many digital tools are designed for Bahasa Malaysia or English-medium instruction, with fewer Mandarin-compatible resources. They faced at limited access to tailored digital resources. It also insufficient professional development and training programs often focus on general digital literacy rather than subject-specific technology integration (Haleem et al., 2022). Some educators prefer conventional methods due to familiarity or skepticism about technology's impact on student outcomes (Stumbrienė et al., 2024). While the TPACK model provides a robust framework for digital integration in teaching, its application in SJKC requires targeted strategies addressing language, cultural, and pedagogical needs.

Studies indicate that Malaysian schools have increased access to digital infrastructure, including smart classrooms, 1BestariNet and online learning platforms (Aziz et al., 2020). However, actual classroom integration remains inconsistent. Research by Irfan Naufal & Amat Sazali (2015) found that while 78% of teachers use basic digital tools (e.g., PowerPoint, Google Search). Only 32% employ interactive methods like gamification or adaptive learning software.

While Malaysia has made progress in digital education infrastructure, effective adoption requires addressing teacher competency gaps, equitable resource distribution and culturally tailored solutions for vernacular schools. Future research should evaluate

customized TPACK training models for SJKC teachers to optimize technology-enhanced learning.

Past Related Studies

	Title	Authors	Year	Digital Competence	Technology Adoption	Primary School	Data Analysis	Country
1.	Digital Competence Among Primary School Teachers in Malaysia	Ahmad, B., & Lim, S.	2020	/		/	Quantitative	Malaysia
2.	Mobile Learning in Low-Income Indian Schools	Patel & Joshi	2020		/		Quantitative and Qualitative	India
3.	Teacher Readiness for Digital Education	Rajendran, N., & Omar, H.	2022	/			Qualitative	Malaysia
4.	1BestariNet Implementation Challenges	Haleem, A., et al.	2022		/		Quantitative and Qualitative	Malaysia
5.	TPACK Implementation in SJKCs	Wong, L.L., & Teoh, H.Y.	2022	/		/	Qualitative	Malaysia
6.	ICT Integration in Malaysian Primary Schools	Chen & Wong	2021		/	/	Quantitative and Qualitative	Malaysia
7.	STEM Digital Tools Implementation	Yusoff & Ali	2022	/			Qualitative	Malaysia
8.	Gamification in Primary Classrooms	Lee et al.	2023		/	/	Quantitative and Qualitative	Malaysia
9.	Teacher Perceptions of Student Digital Readiness in STEM Subjects	Rajoo & Koh	2021	/			Qualitative	Malaysia
10.	Digital Literacy in Japanese Primary Education	Tanaka et al.	2019	/		/	Quantitative	Japan

The above articles explored 10 studies related to the concept of Digital Competence in Malaysian Primary Education and Digital Technology Adoption in Malaysian Education contexts ranging from year 2019 until 2023. The participants in the studies came from different backgrounds involve teachers and students from primary and secondary school levels education. Some of the key findings of these studies include a significant portion of the studies, specifically 5 out of 10, have a primary focus on primary school level of education. Next, a substantial majority, 6 out of 10 studies place an emphasis on the intersection of Digital Competence in Malaysian Primary Education. Based on the research methodology, the majority of the reviewed articles, 4 out of 10 employ qualitative research approach, 2 out of 10 study relies on quantitative research approach which offers a deeper understanding of digital competence and technology adoption. Four research studies utilise mixed-method approach. From the global scope, the studies above showcase a diverse geographical distribution. Eight studies are conducted in Malaysia, one originates respectively from India and Japan. Hence, this representation exhibits the application of Digital Competence In Malaysian Primary Education and Digital Technology Adoption In Malaysian Education in different educational settings. Below are some literature reviews on the articles selected.

Firstly, Ahmad, & Lim, (2020) employed a quantitative research design utilizing survey methodology to assess digital competence levels among Malaysian primary school teachers. Researchers developed a structured questionnaire incorporating Likert-scale items to measure proficiency across various digital competence domains, including digital content creation, communication and pedagogical integration. Data collection spanned multiple regions in Malaysia to capture urban-rural differences, with statistical analysis including descriptive statistics and comparative tests used to analyze the results. While the quantitative approach enabled measurable comparisons across teacher demographics, the reliance on self-reported data may introduce response bias and the exclusion of vernacular schools limits the study's generalizability to Malaysia's diverse educational landscape.

The study revealed several critical insights only 42% of teachers reached proficient digital competence levels, with particularly low scores in content creation (23%) compared to basic digital communication skills (68%). A striking 22% competency gap emerged between urban and rural teachers, attributable to infrastructure disparities and training deficiencies (65% lacked digital pedagogy training). These findings underscore systemic challenges in Malaysia's digital education transformation, particularly the need for targeted training programs addressing both technological skills and pedagogical integration. The urban-rural divide highlights infrastructure inequities requiring policy attention, while the generational differences (tech-savvy younger teachers versus pedagogically experienced seniors) suggest the value of mentorship programs. However, the study's limitations, including its exclusion of vernacular schools, indicate the need for more inclusive follow-up research to develop comprehensive solutions for Malaysia's multicultural education system.

Next, a study by Wong & Teoh (2022) adopted a qualitative research design to investigate TPACK (Technological Pedagogical Content Knowledge) framework implementation in Malaysian Chinese National-Type Schools (SJKC). Researchers employed semi-structured interviews and focus group discussions with SJKC teachers to gather in-depth perspectives on technology integration challenges. The study utilized thematic analysis to identify key patterns and themes emerging from the qualitative data. While this approach provided rich, contextual insights into the unique challenges faced by vernacular school teachers, the methodology was limited by a small sample size and exclusive focus on SJKC institutions. The absence of classroom observations or triangulation with quantitative data may affect the comprehensiveness of findings.

The study identified several crucial barriers to effective technology integration in SJKCs, most notably the severe shortage of Mandarin-language digital content and inadequate technical infrastructure. While teachers demonstrated strong content knowledge (CK), their technological knowledge (TK) and technological pedagogical knowledge (TPK) were underdeveloped due to insufficient training opportunities. These findings highlight the critical need for localized, language-specific digital resources and context-appropriate professional development programs for vernacular school teachers. The proposed tailored TPACK model offers a valuable framework for addressing these challenges, though its applicability to other vernacular school systems (SJKT) remains untested. The study's narrow focus on SJKCs suggests the need for expanded research encompassing Malaysia's diverse vernacular education landscape to develop more inclusive digital education policies.

The study conducted by Lee et al. (2023); a robust mixed-methods design to comprehensively examine gamification implementation in Malaysian primary schools. The quantitative component utilized pre- and post-intervention assessments to measure academic achievement changes, while the qualitative aspect incorporated teacher interviews and classroom observations to evaluate behavioural and engagement outcomes. Researchers implemented various gamification tools (reward systems, interactive challenges) across multiple classrooms, collecting data through standardized tests, surveys and reflective journals. While the mixed-methods approach provided both statistical and contextual insights, the study's methodology was limited by its relatively short intervention period (typically 4-6 weeks) and predominant focus on urban schools, potentially affecting the generalizability of findings to rural educational contexts.

This research demonstrated significant benefits of gamification, with a 40% increase in student motivation and engagement compared to traditional methods, alongside measurable academic improvements. Qualitative findings revealed enhanced student self-confidence and collaborative skills, suggesting gamification's potential for holistic development. However, implementation challenges emerged, including low teacher proficiency only 35% comfortable with gamification tools, increased preparation workload and rural technology access disparities. These findings underscore the need for comprehensive teacher training programs and infrastructure support, particularly for rural schools. While the proposed phased implementation model offers practical guidance, its effectiveness across diverse Malaysian educational settings requires further validation through longer-term studies with more representative samples. The research highlights both the promise of gamification and the systemic support needed for its successful adoption in primary education.

Based on the above studies, the research gaps identified include the need for further research on instructional strategies based on Digital Competence in Malaysian Primary Education and Digital Technology Adoption in Malaysian Education using the different sample size and research approach. Addressing these research gaps would contribute significantly to achieving equitable digital education in Malaysia primary school.

Conclusion

To conclude, this paper has reviewed literature on the background of digital competence and technology adoption in Malaysian primary education, with a specific focus among SJKC teachers in Air Itam district. It highlights several critical avenues for future research to advance digital education in Malaysian vernacular schools. There is an urgent need to develop and validate localized TPACK models specifically designed for SJKC contexts, incorporating Mandarin-language digital resources and culturally responsive pedagogies. Researchers should investigate cost-effective technology solutions tailored for resource-constrained environments with particular attention to rural-urban disparities in infrastructure and access. Longitudinal studies are necessary to examine the sustained impact of technology integration on both teaching practices and student learning outcomes across different school types. Additionally, future studies should explore hybrid professional development models that combine TPACK training with ongoing mentorship and communities of practice. The research should also address the development of inclusive digital pedagogies that accommodate Malaysia's multilingual student populations, including special needs learners.

Comparative studies between different vernacular school systems (SJKC, SJKT) could yield valuable insights for developing equitable, nationwide digital education policies. These research directions would significantly contribute to creating more effective, context-appropriate digital learning ecosystems in Malaysia's diverse primary education landscape.

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