Teachers' Readiness and Integration Challenges in Technology-Enhanced Language Learning in Malaysian Chinese Vernacular Primary Schools

Nur Shahira Mohd Salim[1, 2], Nur Syafiqah Yaccob[1]

[1]Faculty of Education, Universiti Kebangsaan Malaysia, Selangor

[2] SJKC Tanah Mas, Bidor, Perak

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ABSTRACT

This study examines English as a Second Language (ESL) teachers' readiness and challenges in implementing Technology-Enhanced Language Learning (TELL) in Malaysian Chinese vernacular primary schools. Guided by the Technological Pedagogical Content Knowledge (TPACK) and Substitution–Augmentation–Modification–Redefinition (SAMR) frameworks, a qualitative-driven mixed-methods exploratory design was employed. Data were collected through a questionnaire administered to 15 ESL teachers and semi-structured interviews with 5 teachers. The findings indicate a high level of teacher readiness for TELL (M = 4.47, SD = 0.39), alongside a moderate level of challenges (M = 3.86, SD = 0.34). While teachers demonstrated confidence in using digital tools, technology integration remained largely at functional levels, particularly within the substitution and augmentation stages of the SAMR model. The study highlights a gap between teachers' readiness and the depth of implementation, shaped by infrastructural limitations, learner-related constraints, pedagogical challenges, and socio-cultural expectations. These findings underscore the need for subject-specific and flexible professional development, improved infrastructural support, and context-sensitive strategies to promote more transformative TELL practices in multilingual ESL classrooms.

Keywords: Chinese vernacular primary schools, ESL teachers, SAMR, technology-enhanced language learning, TPACK

INTRODUCTION

In recent years, the integration of digital technology has become increasingly prominent in English as a Second Language (ESL) education. Interactive digital tools and student-centred learning materials are widely encouraged to enhance learner engagement and instructional effectiveness (Ghanizadeh et al., 2015; Darus & Abdul Aziz, 2024). This pedagogical approach, commonly referred to as Technology-Enhanced Language Learning (TELL), involves the purposeful use of digital technologies to support language acquisition and classroom instruction (Kranthi, 2017; Hasumi & Chiu, 2024).

In the Malaysian context, national education policies strongly emphasise technology integration across subject areas, including ESL instruction. Despite these policy-driven initiatives, research consistently indicates that the implementation of technology-enhanced practices remains uneven across school types and educational contexts (Ling & Khalid, 2025; Jeng & Zaini, 2025). This suggests that policy expectations alone do not necessarily translate into meaningful classroom integration.

Such uneven implementation is particularly evident in Chinese vernacular primary schools, which operate within multilingual learning environments, where English is taught as an additional language alongside Mandarin and Bahasa Melayu. ESL teachers in these settings are required to address diverse learner proficiencies, while integrating digital tools into their instructional practices. Although some schools have access to digital

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infrastructure, the extent to which technology is used meaningfully to support language learning varies considerably (Ling & Khalid, 2025).

Previous studies suggest that challenges in implementing TELL extend beyond issues of technological access. Factors such as limited pedagogical training, insufficient subject-specific professional development, constrained institutional support, and reduced pedagogical confidence in advanced technology integration play a significant role in shaping teachers' classroom practices (Teo et al., 2024; Dia, 2024). Consequently, technology use in ESL classrooms often remains at functional levels, serving primarily as a substitute or minor enhancement to traditional instructional methods rather than enabling more transformative pedagogical approaches. Although previous studies have examined teachers' readiness for technology integration, empirical studies that focus specifically on ESL teachers in Malaysian Chinese vernacular primary schools remain limited. In particular, there is a lack of context-sensitive research that examines how teachers' readiness and local constraints influence the depth of technology integration in multilingual classroom settings.

To address this gap, the present study examines ESL teachers' readiness and challenges in implementing TELL in Chinese vernacular primary schools located in the Batang Padang district of Perak. Guided by the Technological Pedagogical Content Knowledge (TPACK) framework and the Substitution–Augmentation–Modification–Redefinition (SAMR) model, the study provides empirical insights into teachers' preparedness for technology integration and the extent to which digital tools are meaningfully enacted in classroom practice. The findings aim to inform professional development initiatives and support more context-sensitive approaches to TELL implementation in multilingual primary ESL classrooms.

LITERATURE REVIEW

Tell in Chinese Vernacular Primary School Contexts

In Malaysia, technology-enhanced language learning in Chinese vernacular primary schools presents distinctive pedagogical challenges due to the multilingual nature of these learning environments. In such contexts, Mandarin functions as the primary medium of instruction, while English is taught as an additional language, often with limited exposure beyond the classroom. ESL teachers are therefore required to support learners with diverse linguistic backgrounds and varying proficiency levels while integrating digital tools into their instructional practices (Heng et al., 2021; Chun et al., 2024).

Although some Chinese vernacular primary schools may have access to basic technological infrastructure, existing research suggests that the depth of classroom integration remains inconsistent. Technology use is frequently limited to familiar practices such as digital presentations or online exercises, rather than being leveraged to support meaningful language use or task-based learning (Ling & Khalid, 2025). These findings highlight the need for context-sensitive research that examines how technology is enacted within vernacular ESL classrooms, particularly in relation to teachers' preparedness and the constraints shaping instructional practice.

Teachers' Readiness and Challenges in Implementing TELL

Teacher readiness is widely recognised as a critical factor influencing the successful implementation of technology-enhanced language learning. Readiness encompasses technological competence, pedagogical adaptability, content knowledge, and teachers' beliefs about the usefulness and feasibility of digital tools (Farjon et al., 2019). In ESL classrooms, particularly at the primary level, teachers are expected not only to operate digital technologies, but also to design pedagogically meaningful tasks that align technology use with language learning objectives.

Research suggests that when technology is integrated with clear pedagogical intent, it can support learner engagement, participation, and differentiated instruction in mixed-proficiency classrooms (Ghanizadeh et al., 2015). Multimodal resources and adaptive digital tools offer opportunities to scaffold learning and provide varied forms of language input, which are especially beneficial for young learners (Ghanizadeh et al., 2015; Hasumi &

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Chiu, 2024). However, the pedagogical value of TELL is highly dependent on teachers' ability to make informed instructional decisions, rather than on the presence of technology alone (Haleem et al., 2022).

In the Malaysian context, studies indicate that while many teachers express positive orientations towards technology use, their classroom practices are often constrained by limited instructional time, insufficient subject-specific professional development, and inconsistent technical or institutional support (Donald & Hashim, 2025). These constraints are particularly pronounced in semi-urban and rural settings, where opportunities for professional collaboration may be limited. As a result, technology use frequently remains at functional levels, serving as a substitute or minor enhancement to traditional instructional methods rather than enabling more transformative pedagogical practices (Haleem et al., 2022; Al-Khalidi, 2021).

In Chinese vernacular primary school contexts, these challenges are further compounded by multilingual classroom dynamics, curriculum demands, and learners' varying levels of English proficiency (Ling & Khalid, 2025). Teachers may experience additional pressure to balance examination requirements, parental expectations, and language learning needs, which can influence their willingness and capacity to experiment with technology-enhanced approaches. Together, these factors suggest that teachers' readiness and contextual challenges play a decisive role in shaping not only whether technology is used, but also how deeply it is integrated into ESL classroom practice.

Conceptual Framework Underpinning the Study: TPACK and SAMR

This study is guided by the Technological Pedagogical Content Knowledge (TPACK) framework and the Substitution–Augmentation–Modification–Redefinition (SAMR) model to examine teachers' readiness for TELL and the depth of classroom technology integration. TPACK provides a lens for understanding how teachers' technological knowledge interacts with pedagogical and content knowledge in instructional decision-making (Mishra & Koehler, 2006), while SAMR offers a means of analysing the extent to which technology use moves beyond functional substitution towards more transformative learning practices (Puentedura, 2006). Used together, these frameworks enable a holistic examination of both teachers' preparedness for technology integration and the instructional quality of technology use in ESL classrooms (Al-Khalidi, 2021).

Research Gap and Rationale of the Study

While existing literature highlights the potential of technology-enhanced approaches in ESL education, empirical research focusing on ESL teachers in Malaysian Chinese vernacular primary schools remains limited. In particular, there is a lack of context-sensitive studies that examine how teachers' technological and pedagogical readiness interacts with contextual constraints to shape the depth of classroom technology integration. Much of the existing research focuses on general attitudes or access to digital tools, with less attention given to how readiness and challenges influence actual instructional practices. Therefore, in addressing this gap, the present study draws on the TPACK and SAMR frameworks to examine ESL teachers' readiness and challenges in implementing TELL in Chinese vernacular primary school contexts, with particular attention to why technology use often remains functional rather than transformative.

METHODOLOGY

Research Design

This study employed a qualitative-driven mixed-methods exploratory design to examine ESL teachers' readiness and challenges in implementing Technology-Enhanced Language Learning (TELL). The study aimed to generate in-depth, context-sensitive insights within an under-researched setting rather than to establish causal relationships or generalisable findings. Quantitative data obtained from a questionnaire were analysed using descriptive statistics to identify general patterns of teachers' readiness and perceived challenges. These findings were subsequently supported and elaborated through qualitative data collected from semi-structured interviews, which provided deeper insights into teachers' instructional practices and contextual constraints. The study was guided by the Technological Pedagogical Content Knowledge (TPACK) framework and the Substitution–

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Augmentation–Modification–Redefinition (SAMR) model to enable a structured analysis of both teacher readiness and the depth of technology integration in ESL classrooms.

Participants and Sampling

The participants comprised 15 ESL teachers from Chinese vernacular primary schools (SJKC) in the Batang Padang district, Perak, Malaysia. These schools operate in a multilingual environment where Mandarin is the primary medium of instruction, while English is taught as an additional language. Purposive sampling was employed to recruit teachers who were directly involved in ESL instruction and had experience using digital tools in their classrooms. Although the sample size is relatively small, it is consistent with exploratory mixed-methods research focusing on a niche and homogeneous population (Creswell & Plano Clark, 2018). In the Batang Padang district, many SJKC schools employ only one or two English language teachers, meaning this sample represents a substantial proportion of the total available population of ESL specialists in the area. Given the exploratory nature of the study and its focus on a specific multilingual context, the sample was considered sufficient to generate rich, context-sensitive insights required to address the research objectives.

Research Instruments

Two instruments were used to collect data: a Google Form questionnaire and a semi-structured interview protocol. The questionnaire consisted of two sections: (1) demographic information and (2) Likert-scale items adapted from the TPACK and SAMR frameworks. These items were designed to measure teachers' self-reported technological, pedagogical, and content-related readiness, as well as their perceived challenges in implementing Technology-Enhanced Language Learning (TELL). Responses were recorded using a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." Prior to data collection, the questionnaire was reviewed by two ESL senior lecturers to ensure content validity, clarity, and alignment with the study's research objectives. Revisions were made based on their feedback to improve the relevance and comprehensibility of the items.

The semi-structured interview protocol was developed to explore teachers' experiences and challenges in implementing TELL in greater depth. The interview questions focused on areas such as instructional practices, technological preparedness, classroom constraints, and contextual factors including time, resources, institutional support, and student readiness. The interview protocol was also reviewed by the same experts to ensure its content validity and appropriateness for the study context. Minor refinements were made following their suggestions to enhance question clarity and coherence. During the interviews, follow-up questions were used to clarify and expand participants' responses where necessary.

Data Collection

Data collection was conducted entirely online to minimise disruption to school routines. Permission to distribute the questionnaire was obtained from the district-level English School Improvement Specialist Coach Plus (SISC+) officer, an instructional leader at the District Education Office (PPD) Batang Padang, who facilitated access by allowing the questionnaire link to be shared within the district's English teachers' professional communication network. In addition, informed consent was obtained from all participants prior to their participation. The questionnaire was distributed via a Google Form link, and participation was voluntary. Teachers who indicated their willingness to participate further were invited to take part in an online semi-structured interview conducted via Google Meet. Each interview lasted approximately 30–45 minutes and was audio-recorded with participants' consent. Interviews were conducted in either English or Bahasa Melayu based on participants' preferences to ensure clarity and accuracy of responses.

Data Analysis

Questionnaire data were analysed using descriptive statistics, including mean scores and standard deviations, to identify overall patterns related to teachers' readiness for Technology-Enhanced Language Learning. Statistical analysis was conducted using SPSS software. Although quantitative in nature, this analysis served an exploratory purpose by contextualising the qualitative findings. To interpret the level of teacher readiness and perceived

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challenges, mean scores were categorised into three levels (low, moderate, and high) using equal interval ranges derived from a five-point Likert scale. An interval width of 1.33 was applied to determine the categories (1.00–2.33 = low, 2.34–3.67 = moderate, 3.68–5.00 = high), following the scaling principles described by Best & Kahn (2006).

Interview data were transcribed verbatim and analysed using thematic analysis following Braun and Clarke's (2006) six-phase approach. The analysis was conducted manually, and emerging themes were interpreted in relation to the TPACK and SAMR frameworks. This framework-guided interpretation enabled a systematic examination of teachers' readiness and the challenges influencing the depth and quality of technology integration. Data saturation was achieved within the five interviews, as participants consistently reported recurring themes related to infrastructural barriers, learner readiness, and socio-cultural expectations. The high level of thematic convergence across responses indicates that additional interviews were unlikely to yield new insights.

Ethical Considerations

Several strategies were employed to enhance the credibility and trustworthiness of the findings. Data triangulation was applied by comparing findings from the questionnaire and interviews. In addition, both the questionnaire and interview protocol were reviewed by two ESL senior lecturers from Universiti Kebangsaan Malaysia (UKM) to establish content validity and alignment with the study's objectives. Reflexive notes were maintained throughout the analysis process to minimise researcher bias.

All participants were provided with an information sheet and gave informed consent prior to participation. Confidentiality and anonymity were ensured through the use of pseudonyms and the removal of identifying information from all records. Participation was voluntary, and participants were informed of their right to withdraw at any stage without consequence.

FINDINGS

This section presents the findings of the study based on data obtained from the questionnaire and semi-structured interviews. The findings are organised according to the two core analytical focuses of the study:

1. ESL teachers' readiness to implement TELL, examined through the TPACK framework.

2. Challenges faced by ESL teachers in implementing TELL, interpreted through the SAMR framework.

Demographics of Participants

Table 1 Demographic Profile of Respondents (N = 15)

Demographic Category	Description	Frequency (n)	Percentage (%)
Gender	Male	5	33.3
	Female	10	66.7
Age	25–29	1	6.7
	30–34	2	13.3
	35–39	4	26.7
	40–44	4	26.7
	45–49	3	20.0
	50 and above	1	6.7
Teaching Experience	Less than 1 year	-	-
	1–3 years	-	-
	4–7 years	5	33.3
	8–12 years	7	46.7
	More than 12 years	3	20.0

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School Location	Urban	2	13.3
	Semi-urban	13	86.7
	Rural	-	-
Received Training in TELL	Yes, once	4	26.7
	Yes, more than once	11	73.3
	No	-	-
Frequency of Technology Use	Daily	3	20
	Weekly	12	80
	Monthly	-	-
	Rarely	-	-
	Never	-	-

Table 1 summarises the demographic profile of the respondents. A total of 15 ESL teachers from several Chinese vernacular primary schools in the Batang Padang district participated in the study. The majority of respondents were female teachers, and most were aged between 35 and 44 years old. In terms of teaching experience, most participants had 8 to 12 years of experience teaching English in Chinese vernacular primary school settings. The majority were teaching in semi-urban schools, with a smaller number from urban schools. All respondents reported regular use of digital tools in their English lessons, with most indicating weekly use and a smaller number reporting daily use.

Teachers' Readiness to Implement TELL (TPACK Perspective)

This section reports findings on ESL teachers' readiness to implement Technology-Enhanced Language Learning (TELL) in Chinese vernacular primary schools. Teachers' readiness was examined using the Technological Pedagogical Content Knowledge (TPACK) framework to capture the integration of technological, pedagogical, and content knowledge.

Construct-Level Analysis of Teachers' Readiness (TPACK)

Table 2 Overall Construct Mean for Teachers' Readiness for TELL (N = 15)

Construct	No. of Items	Mean (M)	SD
Teachers' Readiness for TELL	6	4.4667	0.38934

Note. Mean scores were interpreted based on the following categories: low (1.00–2.33), moderate (2.34–3.67), and high (3.68–5.00). This classification follows the principles for interpreting Likert-scale mean scores by dividing the range into three equal intervals of 1.33 (Best & Kahn, 2006).

Table 2 presents the construct-level analysis of teachers' readiness to implement Technology-Enhanced Language Learning (TELL) based on the TPACK framework. The findings indicate a high level of readiness among ESL teachers, with a mean score of 4.47 (SD = 0.39) across six items. This suggests that teachers generally demonstrated strong technological, pedagogical, and content-related preparedness to integrate digital tools into English language instruction. The results reflect teachers' confidence in aligning technology use with instructional goals rather than using digital tools in isolation.

This finding is consistent with previous studies which reported that Malaysian primary ESL teachers generally demonstrate positive readiness and confidence in integrating digital technologies into their instructional practices, particularly in relation to emerging tools such as AI (Chiew et al., 2025). It also aligns with research indicating that teachers' perceived competence plays a significant role in facilitating the initial stages of technology integration (Ishak et al., 2022).

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Questionnaire Findings (Item-Level Highlights)

Table 3 Descriptive Statistics for Teachers' Readiness to Implement TELL (TPACK Components) (N = 15)

No.	Statement	Mean	SD
1	I feel confident using digital tools (e.g., PowerPoint, Google Classroom, Quizizz, YouTube) in my English lessons.	4.53	0.516
2	I can plan English lessons that include technology in a meaningful and effective way.	4.47	0.516
3	I can adjust English language materials (e.g., texts, vocabulary, grammar tasks) to fit different digital platforms or tools.	4.33	0.617
4	I know how to combine technology, teaching strategies, and English content to create effective lessons.	4.53	0.516
5	I am open to trying and experimenting with new digital tools for my English classes.	4.47	0.516
6	My school provides sufficient infrastructure and support (e.g., devices, internet, basic guidance) for me to use technology in lessons.	4.47	0.516

The questionnaire findings indicate that ESL teachers in Chinese vernacular primary schools demonstrate a high level of individual readiness to implement Technology-Enhanced Language Learning (TELL). As shown in Table 3, teachers reported strong confidence in using digital tools in English lessons (M = 4.53, SD = 0.516) and in planning lessons that meaningfully integrate technology with instructional objectives (M = 4.47, SD = 0.516). This finding is consistent with previous research indicating that teachers' confidence in using digital tools serves as a key enabler of technology integration in ESL classrooms, as teacher self-efficacy functions as a critical determinant of how effectively digital tools are enacted in instructional practice (Hong et al., 2025).

High levels of agreement were also recorded for teachers' ability to combine technology, teaching strategies, and English content to create effective lessons (M = 4.53, SD = 0.516), reflecting an integrated understanding of technological, pedagogical, and content knowledge. This is consistent with the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasises the importance of integrating these knowledge domains for effective technology-enhanced instruction (Mishra & Koehler, 2006). In addition, teachers expressed openness toward experimenting with new digital tools for their English classes (M = 4.47, SD = 0.516), suggesting a positive disposition toward innovation and professional growth.

Although teachers generally perceived themselves as ready to implement TELL, slightly lower mean scores were observed for items related to adapting English language materials across different digital platforms (M = 4.33, SD = 0.617). While this score still reflects a positive level of readiness, it indicates greater variation in confidence when teachers engage in more flexible or advanced forms of digital material design. This finding is consistent with studies suggesting that teachers often experience greater difficulty when required to adapt or redesign instructional materials for digital environments, as such tasks demand higher-level pedagogical and technological integration skills, particularly at the transformation levels of the SAMR model where significant task redesign is required (Rajput & Sharma, 2025).

In contrast to strong individual-level readiness, perceptions of institutional support showed greater variability. Although respondents generally agreed that their schools provided sufficient infrastructure and basic support for technology use, differences in access and consistency were implied across school contexts. Similar patterns have been reported in Malaysian contexts, where variations in school infrastructure, particularly internet connectivity and the level of institutional support from school leadership and stakeholders influence the consistency of technology integration across classrooms (Razak et al., 2018).

Overall, the findings suggest that ESL teachers possess solid foundational TPACK readiness, characterised by technological confidence, pedagogical planning ability, and openness to innovation. However, variations in material adaptation skills and perceived institutional support highlight the influence of school-level conditions on the consistency and sustainability of TELL implementation in Chinese vernacular primary classrooms.

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Interview Findings on Teachers' Readiness

The interview findings supported and extended the questionnaire results by providing contextual insights into how teachers' perceived readiness was enacted in classroom practice. Three key themes emerged: confidence in using familiar tools, pedagogical creativity and adaptability, and the need for continuous professional development.

Theme 1: Confidence in using Familiar Tools

Teachers reported strong confidence in using commonly available digital tools such as PowerPoint, YouTube, Quizizz, DELIMa (MOE initiative), and Google Classroom. This confidence was largely attributed to repeated use during periods of online teaching and learning. However, teachers also indicated that their technology use was largely confined to familiar platforms, with exploration of new tools occurring mainly through peer recommendations or external guidance.

"I can use PowerPoint and Quizizz easily and my students enjoy them. But I rarely use new apps, unless it's recommended by someone. But I also think I need to keep up with the latest technology, like AI websites to improve my lesson delivery." (Teacher 3)

This reliance on familiar tools suggests functional technological knowledge, but also reflects a cautious approach to technology integration. Consistent with the questionnaire findings, teachers' practices were primarily aligned with the substitution and augmentation levels of technology use. This finding reflects previous research indicating that teachers may rely on familiar digital tools, which can result in technology use remaining at functional levels of integration, particularly at the substitution stage of the SAMR model where technology is used without significant pedagogical transformation (Ahmad & Rathakrishnan, 2025).

Theme 2: Pedagogical Creativity and Adaptability

Despite reliance on familiar tools, teachers demonstrated pedagogical creativity by adapting digital materials to support learners with varying proficiency levels. Technology was commonly used to scaffold learning, simplify explanations, and differentiate tasks in multilingual classroom contexts.

"Sometimes I make my own slides with pictures to help pupils understand vocabulary. For the more proficient ones, I add higher level quizzes or writing practice. I think using technology is a way for me to teach better and ensure the pupils can follow the lesson and show their understanding through the tasks given." (Teacher 2)

These practices indicate teachers' ability to integrate technological, pedagogical, and content knowledge (TPACK) to support diverse learning needs, even when using relatively basic digital tools. This supports existing literature which suggests that technology can facilitate differentiated instruction, particularly in mixed-proficiency ESL classrooms, by enabling teachers to provide tailored support and multiple learning pathways to accommodate diverse learner needs (Sadhasivam et al., 2023).

Theme 3: Need for Continuous Professional Development

Although teachers expressed positive attitudes toward technology use, they consistently highlighted the need for ongoing, subject-specific professional development. Participants emphasised that existing training was often general in nature and did not sufficiently address pedagogical integration in ESL classrooms.

"We had some technology and AI related courses before related to the DELIMA website and 'Pandai' app, but they were very general. I think to improve better, there should be specific training for English lessons. But I think maybe it can be opened for interested teachers only, because we have limited time. There are many online courses today too, so I think we can learn online, instead of attending courses by the PPD only" (Teacher 4)

In addition, teachers expressed interest in learning about emerging technologies, including AI-based tools, but noted that limited time and insufficient guidance constrained deeper integration. This suggests that while

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teachers' readiness is developing, sustained and targeted professional support is necessary to move beyond surface-level technology use. This finding is consistent with prior studies highlighting that general technology training is often insufficient, and that teachers require subject-specific professional development to effectively integrate digital tools into language instruction, as basic ICT training alone may result in surface-level technology use without meaningful pedagogical integration (Ismail, 2025).

Teachers' Challenges in Implementing TELL (SAMR Perspective)

This section reports findings related to the challenges faced by ESL teachers in implementing Technology-Enhanced Language Learning (TELL) in Chinese vernacular primary schools. These challenges are examined using the Substitution–Augmentation–Modification–Redefinition (SAMR) framework to interpret the depth of classroom technology integration.

Construct-Level Analysis of Integration Challenges (SAMR)

Table 4 Overall Construct Mean for Teachers' Challenges in Implementing TELL (N = 15)

Construct	No. of Items	Mean (M)	SD
Teachers' Challenges in Implementing TELL	8	3.8583	0.34352

Table 4 presents the construct-level analysis of teachers' challenges in implementing Technology-Enhanced Language Learning (TELL) based on the SAMR model. The findings indicate a moderate level of challenges among ESL teachers, with an overall mean score of 3.86 (SD = 0.34) across eight items. This suggests that while teachers were generally able to incorporate technology at basic levels of integration, they continued to encounter constraints that limited more advanced and transformative uses of digital tools in English language instruction.

Questionnaire Findings (Item-Level Highlights)

Table 5 Descriptive Statistics for Challenges in Implementing TELL (N = 15)

No.	Statement	Mean	SD
1	Limited devices (computers, tablets, smartphones) make it difficult to implement TELL.	4.13	0.640
2	Poor internet connectivity is a barrier in my classroom/school.	4.20	0.676
3	I face challenges aligning digital tools with the national English curriculum.	3.07	0.799
4	I lack sufficient training to integrate TELL effectively.	3.20	0.862
5	Students' limited English proficiency makes digital lessons less effective.	4.33	0.617
6	Cultural or parental expectations favour traditional methods over technology-based lessons.	4.00	0.756
7	In practice, I mostly use digital tools as a direct substitute for traditional methods (e.g., using slides instead of textbooks).	4.20	0.676
8	I seldom use technology for more advanced activities (e.g., creating interactive games, collaborative tasks, or activities that cannot be done using traditional methods).	3.73	0.799

Table 5 presents the descriptive statistics for challenges in implementing TELL. For the challenge items, higher mean scores indicate a higher level of perceived challenge. The quantitative findings indicate that ESL teachers in Chinese vernacular primary classrooms face a range of challenges that influence both the consistency and depth of Technology-Enhanced Language Learning (TELL) implementation. As shown in Table 5, the most prominent challenge reported was students' limited English proficiency (M = 4.33, SD = 0.617), highlighting learner readiness as a key constraint in multilingual classroom contexts. This suggests that teachers often need to simplify tasks in the classroom and provide additional scaffolding, which may limit opportunities for more complex technology-enhanced activities.

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Structural barriers were also strongly perceived. Poor internet connectivity (M = 4.20, SD = 0.676) and limited access to digital devices (M = 4.13, SD = 0.640) were identified as significant obstacles, indicating that infrastructural constraints continue to affect the feasibility of sustained technology integration. These challenges persist, even when teachers demonstrate positive attitudes and readiness to use digital tools.

In addition to infrastructural factors, socio-cultural influences were evident. Teachers reported that parental expectations favouring traditional instructional approaches posed a considerable challenge (M = 4.00, SD = 0.756). Such expectations may shape teachers' instructional decisions and discourage experimentation with technology-enhanced practices, particularly in primary school settings.

By contrast, challenges related to professional knowledge and curriculum alignment were perceived as less critical. Teachers reported moderate difficulty in relation to insufficient training for effective TELL implementation (M = 3.20, SD = 0.862) and aligning digital tools with the national English curriculum (M = 3.07, SD = 0.799). The relatively higher standard deviations for these items suggest variation in teachers' experiences, indicating that while some teachers feel adequately supported, others encounter greater difficulty.

Importantly, responses related to instructional practice indicate that technology use in ESL classrooms remains largely confined to lower levels of the SAMR model. Teachers strongly agreed that digital tools are frequently used as direct substitutes for traditional teaching methods (M = 4.20, SD = 0.676), while more transformative forms of technology use were reported less frequently (M = 3.73, SD = 0.799). This pattern suggests that although technology is present in classrooms, its pedagogical potential is not fully realised.

Overall, the findings indicate that challenges in implementing TELL are shaped by a combination of learner-related constraints, infrastructural limitations, and prevailing instructional practices. Together, these factors restrict teachers' ability to progress from substitution-level technology use toward more transformative integration as conceptualised in the SAMR model.

Interview Findings on Implementation Challenges

The interview findings further contextualised the questionnaire results by illustrating how the reported challenges were experienced in classroom practice. Three interrelated themes emerged: infrastructural limitations, limited pedagogical confidence, student-related and socio-cultural challenges.

Theme 1: Infrastructural Limitations

Teachers consistently highlighted infrastructural constraints, particularly unstable internet connectivity and reliance on personal devices or mobile data, as barriers to sustained technology use. Even where digital hardware was available, technical limitations reduced opportunities for more interactive or student-centred activities.

"My school has several laptops from KPM for teachers and students, but usually teachers will use our own laptops. But the issue in my school is that sometimes the Wi-Fi is too slow and doesn't work. I think it's because there are many teachers using the connection at once, so I cannot rely on it during lessons and use my own mobile data and hotspot instead." (Teacher 3)

This finding is consistent with studies in the Malaysian context which highlight that variations in internet connectivity and access to technological infrastructure remain persistent barriers to effective technology integration in schools (Razak et al., 2018).

Theme 2: Limited Pedagogical Confidence

Teachers also reported challenges related to their confidence in designing and managing technology-enhanced lessons. While they were familiar with basic digital tools, they expressed uncertainty about using more advanced

applications in ways that aligned with lesson objectives and supported effective classroom management.

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"Sometimes I want to use more advanced apps or websites for my lessons, but I am worried if it will overwhelm my pupils. It will take time to guide the kids too. Also, I think it's a bit difficult for me to ensure my class objectives can be achieved if I try to use technology in the classroom, because usually the kids will think it's only a time to 'play' with the laptops, and not serious about the lesson." (Teacher 1)

Pedagogical challenges were also evident from the interviews. Although teachers demonstrated basic technological competence, they expressed uncertainty about designing technology-enhanced lessons that were both instructionally purposeful and manageable within limited class time. Concerns about student distraction and classroom control contributed to cautious decision-making, particularly when considering more advanced digital tools. This finding is supported by prior studies which identify time constraints as a key barrier to technology integration, as teachers require additional time to plan and implement digital learning activities effectively (Ismail, 2025).

Theme 3: Student-Related and Socio-Cultural Challenges

Teachers highlighted learner-related factors, particularly low English proficiency and learning difficulties, as significant constraints on technology use. While digital tools were perceived as engaging, teachers often needed to simplify tasks, repeat instructions, or modify activities to ensure inclusivity.

"There are times that I do online activities using Kahoot! and WordWall, but some pupils cannot understand the instructions in English, and I need to explain to them, and it is always time consuming. I also have students with learning difficulties and using online tools can be very confusing for them, so I try to repeat the activities but in a different form, so they get used to them." (Teacher 4)

Student-related factors, such as low English proficiency and learning difficulties, required teachers to simplify tasks and provide repeated explanations. This aligns with previous research indicating that learners' limited language proficiency can hinder the effective use of digital tools, as additional scaffolding and instructional time are required to support comprehension (Sadhasivam et al., 2023).

In addition, socio-cultural expectations, particularly parental preferences for traditional written exercises, also shaped teachers' decisions to balance digital and conventional instructional practices.

"When I do online tasks, pupils will submit their work through Google Classroom. But there are parents who sometimes will complain that online learning is just playing games and that they prefer traditional exercises for their children. There are also times when parents ask me why their children have no homework, so I have to instruct them how to check the submitted works in Google Classroom. So from that I made sure that both written and online works complement each other or balance every week." (Teacher 5)

From the interview, parental expectations favouring traditional written exercises also influenced instructional choices. Teachers described balancing digital and conventional tasks to maintain parental confidence and instructional legitimacy. This finding reflects the influence of socio-cultural expectations in educational contexts, where parents often associate learning with traditional written tasks, thereby shaping teachers' instructional decisions and limiting the adoption of alternative digital approaches (Razak et al., 2018).

Across the interviews, it was evident that teachers' technology use predominantly operated at the Substitution and Augmentation levels of the SAMR model. While some experimentation with creative or AI-assisted tools was reported, these practices were not consistently embedded into instructional design.

SUMMARY OF FINDINGS

Taken together, the findings indicate that ESL teachers in Chinese vernacular primary schools possess foundational readiness to implement TELL, supported by positive attitudes, technological confidence, and pedagogical adaptability. However, the depth of technology integration remains limited by contextual

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constraints, including infrastructural challenges, professional development gaps, learner readiness, and socio-cultural expectations.

From a TPACK perspective, teachers demonstrate functional integration of technology with pedagogy and content, but require sustained support to strengthen deeper instructional alignment. From a SAMR perspective, classroom practices largely remain at the substitution and augmentation levels, with limited progression toward transformative integration. These findings highlight the need to examine not only teacher readiness, but also the contextual conditions that shape how technology is enacted in multilingual ESL classrooms.

DISCUSSION

This section discusses the key findings of the study in relation to the research focus on ESL teachers' readiness and challenges in implementing Technology-Enhanced Language Learning (TELL) in Malaysian Chinese vernacular primary school contexts. The discussion is structured around the two analytical lenses guiding the study: the Technological Pedagogical Content Knowledge (TPACK) framework and the Substitution–Augmentation–Modification–Redefinition (SAMR) model.

Teachers' Readiness for TELL through the TPACK Lens

The findings indicate that ESL teachers in Chinese vernacular primary schools demonstrate foundational readiness to implement TELL, particularly in terms of technological confidence and pedagogical adaptability. Teachers reported being comfortable using familiar digital tools and integrating them into lesson planning, suggesting that their core Technological Knowledge (TK) and Pedagogical Knowledge (PK) are reasonably well developed. This aligns with previous Malaysian studies which reported that teachers are increasingly confident in using basic digital tools for instructional support (Darus & Abdul Aziz, 2024; Teo et al., 2024).

However, readiness appeared uneven across the full spectrum of TPACK components. While teachers demonstrated the ability to combine technology with teaching strategies and language content at a functional level, deeper integration that requires flexible material adaptation and purposeful task design was less evident. This suggests that teachers' readiness is stronger in operational competence than in strategic instructional design, a pattern similarly observed in other ESL and primary school contexts (Ishak et al., 2022; Raman et al., 2022).

The interview findings further reveal that teachers' technological confidence is largely shaped by familiarity and routine use, particularly following experiences with online teaching during the pandemic. Although this exposure has strengthened teachers' willingness to use technology, teachers' reliance on familiar tools may also limit their experimentation with more advanced or innovative practices. From a TPACK perspective, this indicates that while teachers possess foundational knowledge, continued professional development is still required to strengthen the integration between technology, pedagogy, and content in more intentional and pedagogically driven ways.

Challenges in Implementing TELL through the SAMR Lens

The findings demonstrate that ESL teachers face multiple interconnected challenges that influence the depth of TELL implementation. Structural constraints, particularly unstable internet connectivity and limited access to devices, emerged as significant barriers. These challenges restrict teachers' ability to rely consistently on technology during lessons and often necessitate contingency planning, which discourages more ambitious instructional designs. Such findings are consistent with earlier research that highlighted infrastructure as a persistent barrier in Malaysian school contexts (Ling & Khalid, 2025; Jeng & Zaini, 2025).

Pedagogical challenges further compound these constraints. Teachers expressed their uncertainty in designing technology-enhanced lessons that balance engagement with instructional objectives, especially within limited instructional time. In addition, concerns about classroom management and student distraction also contributed to their cautious technology use. These findings suggest that the challenge lies not in teachers' resistance to

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technology, but in limited pedagogical confidence and support for them to implement technology in structured and goal-oriented ways.

Student-related and socio-cultural factors also played a critical role. Teachers reported that students' low English proficiency and learning difficulties required simplified instructions and repeated explanations, which constrained the complexity of digital tasks that could be implemented. Additionally, parental expectations favouring traditional written exercises influenced teachers' decisions to balance digital and conventional practices. These pressures highlight how technology integration is shaped by broader cultural and community expectations, particularly in vernacular school contexts (Heng et al., 2021).

Therefore, viewed through the SAMR framework, these combined challenges help to explain why teachers' technology use largely remains at the Substitution and Augmentation levels. While digital tools enhance presentation and engagement, they are seldom used to redesign tasks or create learning experiences that would be difficult to achieve without technology. Teachers' progression toward Modification or Redefinition also appears constrained by contextual, rather than attitudinal factors.

Connecting Teacher Readiness and Integration Challenges

The findings reveal a clear misalignment between teachers' foundational readiness and the depth of technology integration achieved in classroom practice. Although teachers demonstrated a high level of readiness for Technology-Enhanced Language Learning (TELL) (M = 4.47), their instructional practices remained largely confined to the substitution and augmentation levels of the SAMR model. This suggests that readiness does not automatically translate into transformative classroom implementation, a pattern also observed in previous studies (Hong et al., 2025).

A key insight emerging from the findings is the relationship between teachers' technological-pedagogical readiness and the depth of classroom technology integration. While overall readiness was high, the lowest mean score was observed in teachers' confidence in adapting English language materials across digital platforms (M = 4.33). This limitation appears to directly influence instructional practices, as teachers reported frequent use of technology as a direct substitute for traditional methods (M = 4.20). This relationship suggests that while teachers possess sufficient operational knowledge to use digital tools, they demonstrate comparatively lower confidence in design-oriented competencies, particularly in modifying or redesigning instructional materials. From a theoretical perspective, this indicates that teachers' readiness is stronger at an operational level (using tools) than at a design level (transforming tasks). As a result, technology integration remains largely at the substitution and augmentation levels of the SAMR model, rather than progressing toward more transformative stages such as modification or redefinition. This highlights a critical design–execution gap, where teachers' foundational readiness does not fully translate into deeper pedagogical innovation (Rajput & Sharma, 2025).

In addition to pedagogical factors, the findings highlight the influence of socio-cultural constraints, particularly parental expectations within Chinese vernacular primary school contexts. Teachers reported that some parents perceive digital learning activities as less academically rigorous and continue to prioritise traditional written exercises, especially in the form of homework. This creates a pedagogical balancing act, where teachers must integrate digital tools to enhance engagement while simultaneously maintaining conventional instructional practices to meet parental expectations. Consequently, technology is often used to supplement rather than transform classroom practices, reinforcing its role at the augmentation level. This finding suggests that technology integration is not solely shaped by teacher readiness or infrastructure, but is also influenced by broader community expectations and cultural perceptions of learning.

Furthermore, the findings reveal a learner proficiency paradox, where students' limited English proficiency both necessitates and constrains the use of technology. While digital tools have the potential to scaffold learning through multimodal input and interactive features, teachers reported that low proficiency levels require additional time for explanation, translation, and task simplification. This increased instructional demand reduces the feasibility of implementing more complex or collaborative digital activities within limited lesson time.

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Consequently, teachers tend to rely on simpler, teacher-directed uses of technology, which further restricts progression toward higher levels of integration.

Overall, these findings suggest that teacher readiness should be understood as a dynamic and context-dependent construct, rather than a fixed indicator of capability. Although teachers demonstrate positive attitudes, technological confidence, and willingness to experiment with digital tools, their ability to enact transformative TELL practices is shaped by a combination of pedagogical limitations, infrastructural conditions, learner readiness, and socio-cultural expectations. This interplay explains why technology integration in these contexts remains largely functional rather than transformative, despite the presence of foundational readiness.

SUMMARY OF DISCUSSION

The discussion highlights that ESL teachers in Malaysian Chinese vernacular primary schools are not resistant to Technology-Enhanced Language Learning (TELL). Rather, they demonstrate foundational readiness, characterised by positive attitudes, technological confidence, and a willingness to integrate digital tools into their instructional practices. However, the findings reveal that the depth of technology integration remains constrained by a combination of interrelated factors, including infrastructural limitations, pedagogical design challenges, learner readiness, and socio-cultural expectations. These factors collectively shape how technology is enacted in classroom practice, often limiting its use to functional levels of integration. Drawing on the TPACK and SAMR frameworks, this study highlights that meaningful progression toward transformative technology integration requires more than individual teacher readiness. Instead, it necessitates coordinated support across pedagogical, institutional, and contextual dimensions, ensuring that teachers are equipped not only with technological skills, but also with the capacity and conditions to implement technology in pedagogically meaningful ways within multilingual primary school settings.

Limitations

This study is subject to several limitations. First, the sample size was relatively small and confined to ESL teachers in Chinese vernacular primary schools within a single district. While the sample represents a substantial proportion of the local population, the findings may not be generalisable to other educational contexts or school types. Second, the study relied on self-reported data from questionnaires and interviews, which may be influenced by participants' perceptions and potential response bias. Although efforts were made to enhance credibility through data triangulation and expert validation of instruments, the absence of classroom observations limits the ability to verify actual instructional practices and to capture real-time classroom interactions. Future research could involve larger and more diverse samples across different school contexts, as well as the inclusion of classroom observations or longitudinal designs to provide deeper insights into the implementation of Technology-Enhanced Language Learning in ESL settings.

CONCLUSION

This study examined ESL teachers' readiness and challenges in implementing Technology-Enhanced Language Learning (TELL) in Malaysian Chinese vernacular primary schools, using the TPACK and SAMR frameworks as analytical lenses. The findings indicate that ESL teachers demonstrate foundational readiness for TELL, characterised by positive attitudes, technological confidence, and pedagogical adaptability. Teachers were able to integrate familiar digital tools into their instructional practices and recognised the potential of technology to support engagement and differentiated learning in multilingual classrooms.

However, the study also reveals that the depth of technology integration remains limited. Despite teachers' readiness and willingness to use digital tools, classroom practices largely operate at functional levels, particularly within the Substitution and Augmentation stages of the SAMR model. This pattern is shaped by a combination of contextual constraints, including infrastructural limitations, limited subject-specific professional development, time constraints, learner readiness, and socio-cultural expectations within vernacular school communities.

By integrating insights from the TPACK and SAMR frameworks, this study highlights the dynamic interplay between teacher readiness and contextual conditions in shaping TELL implementation. The findings suggest that meaningful progression toward more transformative technology use cannot be achieved through individual teacher effort alone. Instead, it requires coordinated institutional support, targeted and subject-specific professional development, and context-sensitive strategies that reflect the realities of multilingual primary school settings.

Finally, this study contributes empirical evidence to the under-researched area of TELL implementation in Malaysian Chinese vernacular primary school contexts. It underscores the importance of aligning teacher readiness with supportive instructional environments to ensure that technology integration in ESL classrooms is both pedagogically meaningful and contextually responsive.

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