

Exploring the Use of AI Tools in Teaching English in Malaysian Primary Schools: A Qualitative Case Study of Experienced Teachers

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ABSTRACT

This qualitative case study investigates how experienced English language teachers in Malaysian primary schools integrate Artificial Intelligence (AI) tools such as ChatGPT, Grammarly, QuillBot, and Canva Magic Write into their teaching practices. Five teachers with over five years of experience were purposively selected as participants. Data were gathered through semi-structured interviews and lesson plan analyses. The findings indicate that AI tools assist teachers in lesson design, assessment, and creative classroom engagement. Teachers reported that these tools enhance efficiency, differentiation, and student motivation, though challenges remain regarding technological limitations, overreliance, and the need for continuous professional development. The study highlights that effective AI integration can strengthen English language pedagogy when supported by adequate training, ethical awareness, and technological infrastructure.

Keywords: Artificial Intelligence in Teaching and Learning, English Language Teaching

INTRODUCTION AND BACKGROUND OF THE STUDY

The integration of Artificial Intelligence (AI) into education has expanded rapidly worldwide, transforming teaching and learning across diverse contexts. Within the field of English Language Teaching (ELT), AI tools are increasingly offering teachers innovative ways to plan lessons, assess learning, and differentiate instruction for diverse learners. Educators now use generative AI applications such as chatbots, grammar checkers, paraphrasing tools, and visual design platforms to enhance language learning experiences.

Globally, research on AI in education (AIEd) demonstrates growing interest in how these technologies can enhance teaching effectiveness and learner engagement. Kussin et al. (2023), in a systematic review of AI integration in language learning, found that teachers generally viewed AI positively for its responsiveness and adaptability, though challenges related to pedagogical alignment and teacher readiness persisted. Similarly, Dai and Nasri (2025) concluded that while AI tools can improve teaching and learning outcomes across K–12 and higher education, their effectiveness depends on adequate infrastructure, training, and pedagogical integration. In ELT specifically, AI has been shown to scaffold writing, provide instant feedback, and personalize learning materials, thereby promoting student autonomy and motivation. However, these benefits are tempered by concerns over overreliance on AI, ethical issues, and the potential marginalization of teachers' professional expertise.

Regionally, Southeast Asian countries have also begun exploring AI's role in language education, emphasizing its potential to address challenges of large class sizes, limited resources, and multilingual learner populations. In Malaysia, where English functions as a second language, these affordances are particularly valuable for meeting varied proficiency levels and engaging digitally native learners. Yet, despite policy enthusiasm for digital innovation, research into how Malaysian teachers actually implement and experience AI in everyday classrooms remains limited.

Recent Malaysian studies have begun to shed light on these dynamics. For instance, Zulkarnain and Yunus (2023) found that primary English teachers generally held positive attitudes toward AI integration but expressed the need for more structured professional development and institutional support. Similarly, Kussin et al. (2024) reported that TESL trainees using AI-assisted lesson planning showed enhanced creativity and adaptability, though they struggled with aligning AI-generated content to curriculum standards. Complementing these findings, Salim, Rajan, and Yunus (2025) proposed a framework linking global AI innovations with local ESL practices, highlighting issues of infrastructure readiness, teacher facilitation, and cultural relevance. In special education contexts, Basaruddin and Mustafa (2025) demonstrated how AI tools can reduce teacher workload and promote inclusivity in linguistically diverse classrooms.

Despite these emerging insights, notable gaps remain. Much of the existing research focuses on secondary or tertiary education, pre-service rather than in-service teachers, and quantitative rather than qualitative approaches. Moreover, little is known about how Malaysian primary school English teachers select, adapt, and integrate AI tools in authentic classroom practice. Ethical, practical, and curricular considerations—such as alignment with national learning standards, management of AI bias, and fostering of student autonomy—also remain underexplored. As highlighted by Yan et al. (2023), these issues are increasingly critical in the context of large language models used in education.

Against this backdrop, the present study seeks to address these gaps by exploring how experienced Malaysian primary school English teachers perceive and apply AI tools such as ChatGPT, Grammarly, QuillBot, and Canva Magic Write in their teaching. By examining teachers' experiences, challenges, and classroom strategies, the study aims to provide nuanced insights into the pedagogical implications of AI integration and contribute to ongoing discussions about aligning digital innovation with meaningful, context-sensitive English language teaching.

The objectives of this study are:

1. To explore how experienced Malaysian primary English language teachers use AI tools in their classroom teaching and lesson planning.
2. To identify the perceived benefits and challenges of using AI tools in English teaching.
3. To analyse how lesson plans reflect AI integration in teaching and learning activities.

Research Questions:

1. How do Malaysian primary English teachers use AI tools in teaching and planning?
2. What are the teachers' perceptions of the benefits and challenges of AI tool usage?
3. How do lesson plans demonstrate the integration of AI tools in English language instruction?

METHODOLOGY

This study adopted a qualitative case-study design in order to explore in depth the perceptions, practices, and experiences of primary-school English language teachers in integrating artificial intelligence (AI) tools into classroom instruction and planning. The rationale for a case-study approach lies in its ability to provide rich, contextualised understanding of a phenomenon within its real-life setting (e.g., multiple participants, documents, and settings) rather than seeking statistical generalisation.

Research Setting and Participants

Using purposive sampling, five English language teachers from primary schools in the northern region of Kedah, Malaysia, were selected to participate in the study. The inclusion criteria were: (a) a minimum of five years of teaching experience in primary English (Years 1–5), and (b) documented use of AI tools in their planning or classroom instruction. None of the participating teachers had previously attended formal in-house training specifically on AI in education; this lack of formal training provided a useful dimension for exploring how teachers self-initiated or adapted AI tool usage in practice. The focus on Year 1 to Year 5 teachers allowed examination of AI integration across early primary levels, where learners are developing foundational English

language skills and may benefit from differentiated and technology-enhanced support.

Data Collection

Data were collected primarily through two complementary methods: semi-structured face-to-face interviews and document analysis of lesson plans. Each teacher was interviewed twice in a face-to-face format using a semi-structured interview protocol developed specifically to align with the study's research objectives (i.e., to elicit teacher perceptions of AI tools, their actual classroom usages and planning practices, and perceived implications for English teaching and learning). The dual interviews with each teacher (rather than a single session) allowed for richer elaboration, follow-up probing, and deeper reflection on incremental or evolving practices.

In addition, the researchers collected lesson plans from each teacher for the same period in which AI tool usage was reported. The lesson plans were analysed to confirm the explicit integration of AI-based activities or tools in the planning and implementation of English lessons. This document analysis provided a triangulation of data by comparing teacher discourse during interviews with actual pedagogical artefacts and practices.

Data Analysis

Thematic analysis was selected as the primary analytic technique to identify recurring patterns, categories, and themes in the qualitative data collected (interview transcripts and lesson-plan artefacts). The process of thematic analysis was carried out manually: transcripts were transcribed verbatim, then coded line-by-line to identify initial codes, then grouped into broader categories, and finally themes were derived from these categories. The lesson plans were reviewed through a coding lens to highlight instances of AI tool integration (e.g., prompts generated by AI, grammar tools, visual-design supports) and to map these against interview data. The iterative nature of the analysis allowed the researcher to revisit earlier coding and refine or collapse codes into overarching themes.

Trustworthiness: Validity and Reliability (Credibility, Dependability, Confirmability)

To ensure the trustworthiness of this qualitative case study, several strategies were employed to enhance credibility, dependability, confirmability, and transferability. First, member checking was conducted after the initial thematic coding, where the researcher shared the summarized findings and key themes with the participants. This allowed teachers to verify, clarify, or elaborate on the interpretations, ensuring that the results accurately reflected their actual experiences and practices. Second, triangulation of data sources was implemented by cross-validating information obtained from semi-structured interviews with document analysis of lesson plans. This process strengthened the dependability of the findings by confirming consistency across multiple sources of evidence. Third, an audit trail and reflexive process were maintained throughout the study. The researcher kept detailed records of data collection activities, coding decisions, and analytical reflections on personal assumptions and positionality. This documentation enhanced confirmability by allowing an external reviewer to trace the analytic process transparently. Lastly, thick description was used in the reporting stage to provide rich, contextualized accounts of teacher experiences, classroom environments, and representative quotations from interviews. This detailed narrative enabled readers to understand the context in which the findings emerged and to assess their potential transferability to other similar educational settings (Anney, 2015; Morse et al., 2002; Brink, 1993).

Ethical Considerations

Ethical approval was obtained from the relevant institutional review board prior to data collection. All participants were informed of the study purpose, permitted to withdraw at any time, and consented to participation and audio-recording of interviews. Teachers' identities and schools were anonymised (e.g., Teacher A, School X) and all electronically stored data were secured in password-protected files.

FINDINGS

The thematic analysis of interview transcripts and lesson plan documents revealed five interrelated themes illustrating how primary school English teachers integrated artificial intelligence (AI) tools into their classroom

practice: (1) AI as a lesson design aid, (2) AI-assisted assessment, (3) enhancing student engagement, (4) professional growth and collaboration, and (5) challenges in implementation. These themes demonstrate the multifaceted role of AI in shaping teachers' instructional planning, pedagogical decision-making, and professional identity in the context of Malaysian primary English education.

AI as a Lesson Design Aid

All five participants consistently reported using AI tools such as ChatGPT and Canva Magic Write to support lesson planning, idea generation, and resource development. Teachers perceived these tools as “time-saving partners” that enhanced their creativity and efficiency. Teacher A explained:

“AI helps me design lessons faster and gives me creative activity ideas I might not think of on my own. It’s like having an assistant that’s always ready with suggestions.”

Similarly, Teacher B reflected on how AI complemented their existing pedagogical expertise:

“When I’m not sure how to start a grammar lesson, I use ChatGPT to brainstorm examples and explanations, then I adapt them to suit my pupils’ level.”

Analysis of lesson plans confirmed that AI-generated materials were integrated into daily instruction, particularly for scaffolding vocabulary, reading comprehension, and grammar practice. Teachers often refined AI-generated outputs by simplifying language or contextualizing examples for Malaysian learners. This finding reflects a co-constructive use of AI, where teachers exercise professional judgment rather than passive reliance. It aligns with Kussin et al. (2024), who found that Malaysian TESL trainees used AI to enhance creativity and adaptability in lesson planning.

AI-Assisted Assessment

A second theme concerned the use of AI tools to facilitate formative and summative assessment. Teachers reported employing Grammarly and QuillBot to provide immediate, individualized feedback on students' writing, which they perceived as enhancing efficiency and learning quality. Teacher B emphasized:

“Using Grammarly helps me check students’ writing efficiently. I can focus more on teaching instead of marking every single error.”

Teacher C described how AI tools enabled her to differentiate feedback:

“Some of my weaker pupils can see their mistakes instantly when using Grammarly, and they learn from it right away instead of waiting for me.”

Teachers also used ChatGPT to generate comprehension questions, vocabulary quizzes, and test items aligned with the national English syllabus. This theme indicates that teachers strategically leveraged AI to reduce workload and increase responsiveness in assessment practices. However, most teachers still reviewed and edited AI-generated questions to ensure accuracy and syllabus alignment, reflecting a cautious, reflective stance toward AI-supported assessment.

This finding echoes international studies (e.g., Rocconi et al., 2025; Dai & Nasri, 2025) showing that teacher confidence in AI use depends heavily on their ability to critically evaluate and adapt AI outputs.

Enhancing Student Engagement

Teachers observed that AI-enhanced activities stimulated students' motivation and participation. The visual and interactive elements of AI-supported materials particularly those created using Canva Magic Write were cited as highly engaging. Teacher C shared:

“Students learn happily when they use AI tools because they enjoy seeing instant results. They’re more excited

to write or answer when the slides are colourful and interactive.”

Lesson plan analysis corroborated this perception: AI-designed slides and worksheets incorporated vibrant visuals, word games, and context-based exercises. Teachers also noted that AI tools facilitated active learning, especially when students interacted with content autonomously or collaboratively. Teacher A explained:

“When my pupils use AI-based apps, they take more responsibility for their own learning they explore and ask questions on their own.”

This theme demonstrates that AI integration not only enhanced the aesthetic appeal of materials but also supported learner agency and engagement, particularly for digital-native pupils accustomed to technology-mediated environments. The findings support Zulkefli and Ismail (2023), who reported that AI tools in ESL classrooms improved students’ writing motivation and self-efficacy.

Professional Growth and Collaboration

Another major finding concerns how AI integration fostered teachers’ professional growth, digital literacy, and collegial collaboration. The participants described AI as a catalyst for reflective teaching and professional innovation. Teacher D stated:

“AI made me explore new ways to teach English. It’s like having a digital co-teacher who inspires me to be more creative.”

Teachers reported that experimenting with AI expanded their technological competence and pedagogical repertoire, making them more confident in integrating digital tools. Furthermore, collaboration among teachers emerged as a positive by-product. Teacher E mentioned:

“We share AI-generated materials with one another. Sometimes, one teacher edits what another has created. It saves time and improves our resources.”

This culture of sharing and peer learning reflects the emergence of AI-mediated professional communities, where teachers co-construct digital pedagogical materials. Such findings resonate with Salim et al. (2025), who highlight the potential of AI to enhance teacher collaboration and professional capacity in Malaysian ESL settings.

Challenges in Implementation

Despite the overall positive perceptions, participants acknowledged several challenges in AI implementation. The most common issues included unreliable internet connectivity, limited access to devices, data privacy concerns, and the risk of content inaccuracies. Teacher E expressed:

“Sometimes the internet connection disrupts the lesson. Also, I always double-check AI content because it’s not always accurate.”

Teachers also voiced ethical concerns about overreliance on AI and its potential to reduce critical thinking among students. Teacher B remarked:

“If students depend too much on Grammarly or QuillBot, they might not really learn from their mistakes. I still want them to think and edit on their own.”

Another key issue was the absence of formal professional development or institutional guidance on AI integration. None of the participants had attended official AI training, leading to feelings of uncertainty about appropriate pedagogical use. Teacher A commented:

“We learn by trial and error. There’s no training, so we just experiment and see what works.”

These findings highlight the need for structured AI literacy programmes for teachers, ensuring that AI tools are

used ethically, critically, and effectively in alignment with curriculum standards. This aligns with Zulkarnain and Yunus (2023), who emphasize the importance of professional development to support sustainable AI adoption in Malaysian schools.

Overall, the findings illustrate that AI integration in Malaysian primary English classrooms serves as both a pedagogical support and a professional learning catalyst. Teachers perceive AI as enhancing lesson design, assessment, and engagement, while also contributing to their professional growth. However, successful and responsible integration remains contingent upon teachers' critical awareness, infrastructural readiness, and institutional support mechanisms.

DISCUSSION

This study explored how Malaysian primary school English teachers integrate Artificial Intelligence (AI) tools into their teaching, assessment, and professional practice. Five key themes emerged AI as a lesson design aid, AI-assisted assessment, student engagement, professional growth, and challenges in implementation each highlighting the nuanced and evolving relationship between teachers and AI technologies in the classroom.

The findings revealed that AI tools such as ChatGPT and Canva Magic Write serve as powerful pedagogical partners, enabling teachers to design lessons that are more creative, efficient, and responsive to students' needs. This aligns with Zawacki-Richter et al. (2019), who argued that AI enhances teachers' instructional design capacities by automating routine tasks and generating diverse learning materials. The teachers in this study used AI to scaffold grammar and vocabulary activities, thus embodying the principles of Vygotsky's (1978) sociocultural theory, where tools mediate human cognitive development. However, the teachers' selective use of AI also indicates a critical awareness demonstrating pedagogical agency rather than technological dependency. This finding echoes Yunus and Hashim (2022), who noted that Malaysian educators often integrate technology thoughtfully to support, rather than replace, their instructional judgment.

Teachers' use of Grammarly, QuillBot, and ChatGPT in assessment contexts reflects an emergent trend in AI-driven formative evaluation. Through automated feedback, teachers reduced their marking load and provided timely corrections to students, enhancing feedback loops crucial for language learning (Li, 2020). Nevertheless, the teachers' caution in verifying AI-generated feedback underscores a key issue raised by Rocconi et al. (2025) that AI systems can perpetuate linguistic inaccuracies or cultural biases if not critically mediated by human oversight. The teachers' experiences demonstrate that while AI supports efficiency and accuracy, teacher expertise remains indispensable in interpreting students' linguistic progress and contextualising feedback within the Malaysian curriculum standards.

Consistent with the literature on AI-mediated motivation (Holmes et al., 2022), teachers observed that AI tools heightened learners' engagement and enjoyment. Applications like Canva Magic Write and interactive AI platforms made lessons more visual and multimodal, appealing to digital-native learners. These findings resonate with Mayer's (2014) multimedia learning theory, which posits that combining verbal and visual stimuli enhances comprehension and retention. However, some teachers reported uneven engagement across proficiency levels, suggesting that AI integration should be differentiated to prevent cognitive overload for lower-proficiency learners a concern also noted by Kessler (2023) in AI-assisted language teaching contexts.

The teachers' narratives also highlight AI's role as a catalyst for professional development and peer collaboration. By experimenting with AI-generated resources, teachers expanded their digital literacy and creative repertoire, aligning with the notion of teacher learning as transformative practice (Mezirow, 1997). Sharing AI resources with colleagues fostered a collaborative professional culture reminiscent of communities of practice (Wenger, 1998), where shared problem-solving and innovation enhance collective pedagogical knowledge. Yet, the absence of formal AI-related training underscores the need for structured institutional support to sustain and guide this organic professional learning.

Despite the benefits, the study identified several critical challenges. Teachers expressed concerns about AI reliability, ethical integrity, and infrastructural barriers, such as poor internet access issues consistent with Kumar

et al. (2024), who emphasized that technological adoption in Malaysian schools is uneven due to infrastructure disparities. Furthermore, teachers' apprehension about content accuracy and data privacy aligns with global debates on AI ethics in education (Williamson & Piattoeva, 2022). These findings suggest that without clear policy guidelines, teachers may continue to rely on personal discretion, potentially leading to inconsistent practices and unequal learning experiences.

This qualitative case study provides nuanced insights into how experienced Malaysian primary school English teachers integrate AI tools into their teaching. The study concludes that AI functions as both a pedagogical amplifier and a professional catalyst, enriching lesson design, assessment, and teacher collaboration. However, its effectiveness depends largely on teachers' critical engagement, contextual understanding, and infrastructural support. The findings reaffirm that AI cannot replace the teacher's judgment but can enhance their pedagogical creativity and efficiency when used reflectively. Importantly, the study underscores that AI literacy the ability to critically evaluate, adapt, and ethically apply AI tools is now an essential competency for 21st-century educators.

RECOMMENDATIONS

Based on the findings and discussion, several key recommendations are proposed to enhance the effective and ethical integration of Artificial Intelligence (AI) in English Language Teaching (ELT) within Malaysian primary schools. Firstly, there is an urgent need for structured professional development programs focusing on AI integration in pedagogy. The Ministry of Education (MOE) should provide systematic training that goes beyond basic digital literacy to include practical, hands-on workshops on prompt design, ethical considerations, and critical evaluation of AI-generated content. Such initiatives would empower teachers to use AI not merely as a time-saving tool but as a pedagogical partner that complements their instructional creativity and professional judgment.

Secondly, clear policy and ethical guidelines must be developed at both national and institutional levels to ensure responsible AI use in schools. These policies should address concerns related to data privacy, content reliability, and intellectual property while aligning with Malaysia's *Digital Education Policy 2023–2030*. Teachers require well-defined frameworks that help them navigate the ethical complexities of AI use in teaching and learning.

Thirdly, infrastructure enhancement is vital to ensure equitable access to AI technologies. Many teachers, particularly those serving in rural or northern regions, face inconsistent internet connectivity and limited access to digital devices. The government should therefore prioritise upgrading school infrastructure to support the seamless integration of AI-compatible tools. Without sufficient technological support, even the most well-designed AI initiatives will remain ineffective and isolated.

In addition, fostering collaborative learning communities among teachers is crucial. Schools and educational authorities should encourage the establishment of *AI Teaching Circles* or online communities of practice where teachers can exchange resources, share AI-generated lesson materials, and reflect collectively on the challenges and successes of implementation. This peer-driven approach not only promotes innovation but also builds a supportive culture of continuous professional learning.

Lastly, curriculum alignment and research expansion are necessary to sustain the meaningful adoption of AI in education. AI literacy should be embedded across teacher education programs to prepare future educators for technology-mediated instruction. Moreover, ongoing research particularly qualitative and mixed-method studies—should be conducted to explore the long-term implications of AI integration on student achievement, teacher professional identity, and educational equity. Such research would provide empirical evidence to guide policy formulation and pedagogical practice in Malaysia's evolving AI-in-education landscape.

REFERENCE

1. Abdul Ghani, M. T., et al. (2024). Responsible and ethical use of artificial intelligence in language education: A systematic review. *Forum for Linguistic Studies*, 6(5). <https://doi.org/10.30564/fls.v6i5.7092>

2. Anney, V. N. (2015). Ensuring the quality of the findings of qualitative research: Looking at trustworthiness criteria. *Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS)*, 5(2), 272–281.
3. Basaruddin, M. A., & Mustafa, H. R. (2025). Empowering AI for English materials analysis in Malaysian primary special education schools. *Asian Journal of English Language & Pedagogy*, 13(1), 16–40. <https://doi.org/10.37134/ajelp.vol13.1.2.2025>
4. Brink, H. I. L. (1993). Validity and reliability in qualitative research. *Curationis*, 16(2), 35–38.
5. Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Sage.
6. Dai, J., & Mohamad Nasri, N. (2025). The integration of AI in K–12 and university English language teaching: A systematic literature review. *International Journal of Academic Research in Progressive Education and Development*, 14(2), 1–15. <https://doi.org/10.6007/IJARPED/v14-i2/25369>
7. D. Kriukow. (n.d.). *Validity and reliability in qualitative research Qualitative Researcher*. <https://drkriukow.com/validity-and-reliability-in-qualitative-research/>
8. Haddi @ Junaidi, K., Megat Khalid, P. Z., Sulaiman, S., Abu Sufi, M. K., & Chaniago, R. H. (2023). Systematic literature review: Integrating artificial intelligence (AI) in teaching and learning of language. *Asian Journal of English Language & Pedagogy*, 11(1), 108–119. <https://doi.org/10.37134/ajelp.vol11.1.8.2023>
9. Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.
10. Iksan, Z. H., & Saper, M. N. (n.d.). The process of validity and reliability for verbal questioning research in the classroom. *Global Journal of Educational Studies*.
11. Kessler, G. (2023). The future of AI in language education: Promise and pedagogical challenges. *Language Learning & Technology*, 27(1), 1–12.
12. Kumar, R., Zulkifli, H., & Omar, F. (2024). Challenges and opportunities in AI adoption among Malaysian educators. *Malaysian Journal of Educational Technology*, 24(2), 14–28.
13. Kussin, H. @ J., Megat Khalid, P. Z., Chaniago, R. H., Moneyam, S., & Hassim, H. E. (2024). The future of lesson planning: AI integration experiences among TESL teacher trainees in a Malaysian public university. *Asian Journal of English Language & Pedagogy*, 12(2), 178–189. <https://doi.org/10.37134/ajelp.vol12.2.13.2024>
14. Li, S. (2020). The impact of feedback timing and modality on second language writing. *Language Teaching Research*, 24(3), 348–369.
15. Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research* (6th ed.). Sage.
16. Mayer, R. E. (2014). *The Cambridge handbook of multimedia learning*. Cambridge University Press.
17. Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education*, 74, 5–12. <https://doi.org/10.1002/ace.7401>
18. Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International Journal of Qualitative Methods*, 1(2), 13–22.
19. Novitasari, Y., Bastian, A., Reswita, & Wahyuni, S. (2023). The role of artificial intelligence (AI) technology in the development of early English teaching materials. *Global Education Journal*. <https://journal.civiliza.org/index.php/gej/article/view/819>
20. Rocconi, L. (2025). AI literacy: Elementary and secondary teachers' use of AI tools, reported confidence, and professional development needs. *Education Sciences*, 15(9), 1186. <https://doi.org/10.3390/educsci15091186>
21. Rocconi, L., Talanquer, V., & Guzmán, S. (2025). Teacher confidence and the use of AI in global classrooms. *Computers & Education*, 205, 105–145.
22. Salim, N. S., Rajan, A., & Yunus, M. M. (2025). Bridging global AI innovations with local ESL classrooms: A conceptual framework for adaptive language learning tools. *Semarak Proceedings of Computer Science and Engineering*, 1(1), 41–56. <https://doi.org/10.37934/spcse.1.1.4156a>
23. SimplyPsychology. (n.d.). *Reliability & validity in qualitative research*. <https://www.simplypsychology.org/reliability-and-validity-in-qualitative-research.html>
24. VNU Journal of Foreign Studies. (n.d.). *Understanding validity and reliability from qualitative and*

quantitative research traditions.

25. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
26. Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.
27. Williamson, B., & Piattoeva, N. (2022). Education governance and data ethics in the age of AI. *Learning, Media and Technology*, 47(1), 1–14.
28. Yunus, M. M., & Hashim, H. (2022). The integration of digital technologies in Malaysian classrooms: Teachers' perspectives and challenges. *Asian Journal of University Education*, 18(2), 121–134.
29. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. *International Journal of Educational Technology in Higher Education*, 16(1), 1–27.
30. Zulkarnain, N. F., & Yunus, M. M. (2023). Exploring Malaysian teachers' readiness towards AI integration in English teaching. *Journal of English Language Teaching Innovations*, 3(1), 45–59.
31. Zulkarnain, N. S., & Yunus, M. M. (2023). Primary teachers' perspectives on using artificial intelligence technology in English as a second language teaching and learning: A systematic review. *International Journal of Academic Research in Progressive Education and Development*, 12(2), 58–75. <https://doi.org/10.6007/IJARPED/v12-i2/17119>
32. Zulkefli, N. H., & Ismail, H. H. (2023). The impact of AI on ESL writing autonomy: A systematic review. *Malaysian Journal of Social Sciences and Humanities*, 10(8), 1–12. <https://doi.org/10.47405/mjssh.v10i8.3555>