

RESEARCH ARTICLE

Learners' perceptions and challenges of artificial intelligence-assisted third language learning: Implications for a preliminary pedagogical model

Ting Hie Ling¹, Tang Howe Eng^{2*}, Siti Faridah Kamaruddin¹, Nur Nadia Qausar Juhari¹, Muhammad Anas Abdul Razak¹, Lam Kai Chee³

¹Academy of Language Studies, Universiti Teknologi MARA, Sarawak Branch, 96400 Mukah, Sarawak, Malaysia

²Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA, Sarawak Branch, 96400 Mukah, Sarawak, Malaysia

³Faculty of Education, Language and Communication, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak

Abstract - Artificial intelligence (AI) has emerged as one of the technologies used increasingly by university students to aid their learning processes, but this does not seem to be applicable to the learning of third languages apart from English in Malaysia. This present research paper sought to investigate the perception of using artificial intelligence by university students in Malaysia as well as the challenges they face when using artificial intelligence tools to learn other foreign languages such as Mandarin and Arabic. Using a descriptive quantitative survey design, data were collected via an online questionnaire from 230 diploma students at Universiti Teknologi MARA (UiTM) and analysed using descriptive statistics in SPSS. Based on the analysis of the data collected from 230 diploma students undertaking Foundation of Mandarin and Foundation of Arabic, it was established that learners generally perceived artificial intelligence as helpful, enabling quick access to learning support via mobile devices. However, some disadvantages encountered by learners are caused by the inability to access the internet and slow network connections were perceived to arise from high costs of data usage and the lack of tools designed for third language learning. Based on these findings, the study proposes a preliminary AI-mediated third language learning pedagogical model, derived from the survey findings that positions AI as a supporting tool within instructional design and lecturer mediation. Overall, the findings point to the view that AI presents possibilities to strengthen third language learning and its proper use can be achieved through infrastructure, guided integration, and responsible learning practices.

Article History

Received: 23 February 2026

Revised: 5 June 2026

Accepted: 1 July 2026

Published: 30 September 2026

Keywords

AI-assisted language learning
AI-mediated third language learning (AM-L3)
Artificial intelligence
Pedagogical model
Third language learning

1. Introduction

Learning a third language (L3) is a distinct process that presents its own unique set of cognitive and affective difficulties, which is different from the process of acquiring a first or second language. The acquisition process of L3 is similar to L2 learning but also shows distinct characteristics, including cross-linguistic influences from both L1 and L2, which may either facilitate or obstruct the learning process (Sadouki, 2025). A foreign language refers to a language that is not native to the speaker, while a third language is an extra language acquired after the first (L1) and second (L2) languages (Bardel & Sánchez, 2020). In the Malaysian higher education context, learning a third language usually occurs in multilingual classrooms where students use Malay, English or other indigenous languages. Mandarin and Arabic are available as either elective or mandatory university language courses at many Malaysian universities. Students with different linguistic backgrounds are further exacerbated by the limited opportunities for exposure to the language outside the classroom and the intricate dynamics of the learners' existing linguistic abilities (Ling et al., 2022). As such, educators are always looking for ways to facilitate learning and make L3 learning more effective and engaging.

Artificial Intelligence (AI) has revolutionised various industries, including education. AI served as an innovative tool and method to enhance learning experiences. In Malaysia, higher education institutions are integrating an increasing number of AI-assisted technologies to facilitate third language learning to improve efficiency, engagement, and personalised learning outcomes. From learners' perspectives, AI-assisted language learning together with educators' support has been found to contribute to learners' positive emotions and psychological well-being positively. This combination helps mitigate technostress and create a supportive learning environment (Yang et al., 2025). Students display varying degrees of engagement and perceptions about AI-supported learning. Learner profiles were identified by Zhai and Chen (2025) as consisting of categories like enthusiastic but weak belief, strong belief, and active engagement, which are influenced by individual backgrounds like gender and previous AI exposure. According to this classification, learners who are more aware of and prepared to integrate AI applications such as ChatGPT into their coursework can more fully recognise the benefits of increased productivity and customised learning (Sarwanti et. al., 2024). Despite this, they remain apprehensive regarding potential issues with factual correctness, the impact on critical analysis, and academic dishonesty.

However, the use of AI in education has not been without its challenges. Problems such as the ethical use of AI, data privacy, academic integrity, and the possible effects on critical thinking skills have been widely documented (Bittle & El-

Gayar, 2025). The use of AI tools has been linked to ethical problems such as the inability to identify the true authors of assignments and the evaluation of true performance, leads to plagiarism and academic integrity problems (Huertas-Abril & Hà, 2024). AI tools sometimes fail to integrate with the cultural nuances and colloquial speech, which can make it difficult for students to adapt to the cultural setting (Yulianto et al., 2025). There is a large gap between the students' expectations and the current use of AI technology in education. Students have raised concerns about overdependence on AI technology, disengagement, and the need for ethical guidelines (Homer et al., 2025).

The brief review on previous studies has shown that the use of AI tools with their ability to offer personalised feedback, interactive learning, and immediate access to a vast number of resources, presents promising avenues for third language learners. However, this integration is not without its difficulties, as the views of learners and the use of AI tools can greatly influence its success. Moreover, the views of learners on AI tools, as well as the difficulties they face in using these tools, also require further exploration to ensure successful integration into frameworks of language learning (Ng et al., 2025; Park, 2025). Thus, the purpose of this current study is to explore these issues and offer recommendations.

1.1 Problem Statement

There has been an increase in the integration of artificial intelligence (AI) in language learning. As stated earlier, AI has the ability to improve language learning by offering personalised learning experiences, high engagement levels, and efficient use of resources. However, despite the fact that a substantial amount of research has been carried out on AI-based language learning in English as a second language (ESL) settings, there is a substantial research gap in understanding its application in third language (L3) learning, particularly in Mandarin and Arabic languages, to make graduates more globally competitive. Since learning a third language (L3) is distinct from traditional L2 acquisition, learners usually manage several language systems at once, leveraging their previous language knowledge during the learning process. According to the Dynamic Model of Multilingualism, multilingual learners experience intricate interaction between their language knowledge, learning strategies, and learning environments. Furthermore, third language learners typically encounter the target language mainly in formal classes. As such, they often depend on mobile technologies and AI-based tools for third language learning. Consequently, AI-assisted tools in L3 learning can serve as additional learning aids and a compensatory resource for practising pronunciation, acquiring vocabulary, facilitating translation, and promoting autonomous learning. Nevertheless, the exposure to English is relatively frequent as compared to the third language, where the third language learners can only experience the target language in a classroom setting. Thus, the pedagogical function of AI in learning a third language may differ from its role in general AI-assisted ESL learning.

The distinctiveness of the Mandarin languages in terms of logographic writing systems, tonal dialects, and morphological patterns may not be fully addressed by the AI technology designed for the English language (Chua et al., 2024). In contrast to Mandarin language, implementing AI in Arabic language learning classrooms also constitutes other difficulties which can be categorised into three broad categories, such as technological challenges, including inaccurate grammar and translation, limited Arabic-language support, lack of Arabic linguistic expertise, and lower maturity than English AI; pedagogical challenges like overdependence on AI, weak learner autonomy, reduced critical thinking, and superficial learning as well as ethical challenges, namely academic integrity issues, plagiarism, and uncertainty about authorship and originality (Wan Adnan, 2025). Although AI technology is increasingly being used in Malaysian classrooms, there is a lack of studies that explore how learners perceive and interact with these technologies in L3 learning (Soon et al., 2024).

Furthermore, the existing literature has not given adequate attention to the mismatch between the expectations of students and the reality of applying AI in the educational setting. Variables such as disparities in technological skills, cultural disparities, and the ethical dimensions of academic integrity create a complicated scenario that results in the ineffective use of AI in language learning (Mohamed, 2024). This mismatch has created critical concerns such as the effectiveness of AI applications in satisfying the demands of learners and the potential risks associated with the application of AI. Therefore, to address the aforementioned research gaps, this study aims to achieve the following objectives:

1. To investigate learners' patterns of AI tool use in third language learning with regard to usage frequency, access devices, and self-rated confidence levels.
2. To explore learners' perceptions of the benefits and affordances of AI tool use in third language learning, particularly with regard to the accessibility, time efficiency, mobility, and learning support.
3. To examine the challenges learners' encounter when integrating AI tools into third language learning, particularly with regard to connectivity, cost-related limitations, and non-academic use.
4. To propose a preliminary AI-mediated third language pedagogical model (AM-L3) grounded in learners' experiences, benefits, and challenges.

1.2 Artificial Intelligence (AI) in Language Learning

Artificial Intelligence (AI) is a multidisciplinary field of computer science and engineering that focuses on developing systems, machines, or software that can demonstrate abilities and traits usually associated with human intelligence. Essentially, AI is the simulation or imitation of human intelligence processes by machines which enables them to accomplish tasks that would otherwise require human thought and intervention (Radzuan & Arif, 2025; Zhang & Lu, 2021). According to Darda and Pendse (2025), this encompasses a wide range of cognitive activities such as learning from data and experience, logical reasoning, autonomous decision-making, and problem-solving. Therefore, applying AI

to language education means utilising advanced computational tools to enhance both the teaching and acquisition of languages. Scholars including Almelhes (2023), Barrios-Beltran (2024), Maltseva and Pavlova (2025), Tekman and Tekman (2025), Tran et al. (2026), and Yu and Qiu (2026) have observed that AI integrates technologies like speech recognition, adaptive learning, and natural language processing to create tailored and impactful language learning environments.

1.3 AI integration in Third Language Learning: An Overview

Li et al. (2022) observe that swift technological advancements have elevated the awareness of both educators and learners concerning AI's capacity to improve conventional teaching approaches. Echoing this sentiment, Salas-Pilco and Yang (2022) highlight AI as a highly regarded adjunct to language education, positioning it as a perfect fit for incorporation into third-language instruction. Gazaille (2023) further argued that AI's capacity for adaptive testing and personalised learning makes it a transformative element capable of reshaping higher education. Hence, the following review aims to bring together the available literature on the various roles of AI technology in the acquisition of third or foreign languages, including their advantages, disadvantages, and challenges.

1.3.1 Pedagogical Roles of AI in Third Language Education

AI serves several critical and interrelated functions in the language learning ecosystem. A primary role of AI is to enable highly personalised learning experiences. AI can provide a highly personalised learning experience by analysing student data, including performance, learning rate, and mistakes (Amini et al., 2025; Torres & Statti, 2025; Kasap, 2024). Personalised learning with AI tools caters to different learning styles and ensures learners are not bored or frustrated, a critical function of adaptive learning systems (Radzuan & Arif, 2025; Alqaed, 2024).

The Intelligent Tutoring Systems (ITS) are enabled by AI to provide learners with one-on-one tutoring experiences, delivering immediate and personalised feedback (Wang et al., 2024). Immediate, personalised feedback is beneficial for learners to develop their speaking and writing skills. For instance, AI can serve as a conversation partner or a writing assistant to assist learners in correcting their grammar and vocabulary and improve their pronunciation (Nazari et al., 2021). In addition, through highly interactive and gamified learning experiences, learners are highly engaged and motivated to learn (Yuan & Liu, 2025). This improved engagement with learning directly correlates with enhancing learning outcomes and learners' willingness to communicate (Shafiee Rad, 2024). Furthermore, AI can assist educators by freeing up more time to focus on more critical tasks by automating administrative tasks (Torres & Statti, 2025). Amini et al. (2025) mentioned that AI can provide educators with insight to develop more effective learning strategies.

The studies above have alluded to the fact that AI-assisted tools enable learners in third language learning by providing instant feedback, modelling pronunciation, assisting with vocabulary, and offering self-directed learning opportunities. In Mandarin and Arabic learning environments, learners might have limited exposure beyond structured lessons and hence, AI-driven tools can serve as additional learning tools in addition to classroom engagement

1.3.2 Learners' Perceptions Towards the Advantages of AI Integration

There are several significant advantages of AI integration in language learning. AI tools were seen to be effective in improving language skills. For instance, AI-mediated interactive speaking was found to be more effective in improving EFL learners' speaking skills and their willingness to communicate (Fathi et al., 2024). Another study noted significant improvements in the use of idea-generation and content-refinement strategies among EFL learners (Lee et al., 2025). From these previous studies, AI tools were seen to be effective in the improvement of language skills (Kasap, 2024; Wang et al., 2024). AI tools were also seen to make high-quality language education more accessible and flexible, allowing learners to learn anywhere, anytime (Tran et al., 2026). Moreover, the potential of AI tools for processing learners' data was found to lead to a degree of customisation, which was previously impossible in the traditional setting (Amini et al., 2025; Gazaille, 2023). AI tools were seen to be able to offer individualised support to a large number of learners simultaneously, which was previously impossible due to limited human resources.

AI-assisted learning environments can foster learner independence by allowing individuals to practise and refine their language abilities on their own beyond traditional classroom settings. By offering features like instant feedback, customised learning assistance, and adaptable learning systems, learners can advance at their own speed while cultivating self-regulation and autonomous learning techniques (Aliyeva et al., 2026; Alava-Arboleda et al., 2025; Dinata et al., 2025). This independent learning assistance might be especially crucial in third language learning environments where chances for authentic exposure to the target language are limited beyond the classroom. On the other hand, learners without robust self-discipline may struggle to use AI successfully in their learning circumstances.

1.3.3 Learners' Perceived Disadvantages and Challenges of AI Integration

Despite the advantages, integrating AI into language learning comes with considerable challenges and disadvantages. Empirical evidence shows that the application of AI increases language proficiency (Kasap, 2024; Wang et al., 2024). In addition, AI ensures that high-quality language learning is more accessible and flexible, providing opportunities for learning (Kasap, 2024). Nevertheless, the first challenge associated with AI is the potential to perpetuate and amplify the bias inherent in the data used to train the AI, which might result in biased and offensive content in language learning (Amini et al., 2025; Chen et al., 2025). Data privacy, security, and the lack of transparency in AI decision-making are other significant challenges faced when AI is integrated into language learning, which is commonly known as the "black box" phenomenon (Aljabr et al., 2025). Overreliance on AI might limit language learners from enjoying other essential

opportunities to interact with other humans and develop other important cognitive skills (Amini et al., 2025; Chen et al., 2025). In addition, there are also some other threats to diminish the social and collaborative aspects of language learning (Sun et al., 2025).

The disparity between those with and without access to technology and internet connectivity might further widen the gap between the haves and have-nots, potentially leading to further inequalities (Tran et al., 2026; Amini et al., 2025). Although AI promotes independent learning, educators continue to play a crucial role in mitigating challenges such as unequal technological access and over-reliance on automated system. For students to develop effective and ethical AI usage habits in third language contexts, educators must foster these practices starting at the primary and secondary levels. Therefore, language educators need to be skilled and knowledgeable in the critical and creative use and application of AI significantly for successful integration. There is a significant gap between the available knowledge and the application of AI for language learning, as many language educators lack the necessary knowledge to effectively and harmoniously integrate AI with other language learning strategies (Aljabr et al., 2025; Torres & Statti, 2025). The success and acceptance of AI tools are greatly determined by perceptions (Kelly et al., 2023).

1.3.4 Learners' Perceptions and Attitudes towards AI Integration

The emotions that learners experience with the help of AI tools are both positive and negative. Positive emotions such as motivation and engagement were evident among learners. However, negative emotions such as frustration, anxiety, and stress were also evident (Fathi et al., 2024). Furthermore, the use of AI-based language tests reduced foreign language anxiety (FLA) and enhanced attitudes and motivation among learners (Biju et al., 2024). Most studies have found that learners have a positive attitude towards learning a language with the help of AI tools. For example, Chinese EFL learners experienced positive emotions such as motivation, excitement, engagement, and confidence through AI tools in their classes (Xin & Derakhshan, 2025). Another study on the use of AI-mediated speaking activities among EFL learners found that learners had a positive attitude and perception about the instruction (Fathi et al., 2024). A study on the use of ChatGPT among Saudi university students found that learners had moderately positive attitudes towards the tool and believed it enhances their understanding and communication skills in English (Alharthi, 2024). Additionally, Mat Yusoff et al. (2025) found that learners generally demonstrated positive attitudes toward AI integration, perceiving AI as a useful and satisfying tool that enhances learning and supports academic achievement and should continue to be incorporated into higher education. At the same time, Mat Yusoff et al. also pointed out that learners' adoption of AI was influenced more by perceived usefulness and user satisfaction than by concerns regarding content quality or credibility. Thus, these previous studies have clearly demonstrated that AI is important in the education of third and foreign language learners. In other words, AI can be a game changer in the education sector. AI can be a tutor, a feedback tool, and an analyst that can bring about a sea of change in the way language is taught and learned. Nevertheless, several challenges mentioned earlier must be addressed before the benefits of AI can be reaped.

2. Methodology

2.1 Research Design

The research design that was adopted in this study was a descriptive quantitative survey design that helped to investigate the patterns of use of AI tools, perceptions, and challenges faced by learners in adopting artificial intelligence (AI) for third language (L3) learning without changing any variables. The descriptive quantitative research design is the most suitable research design when the objective of the research is to measure the features of the phenomenon at a particular point in time, including technology use, access devices, and perceptions of learners (Creswell & Creswell, 2023). By adopting a structured survey instrument, this research design helps to determine representative data about the use of AI tools by learners, which is very important to establish an empirical foundation that can be used to develop a pedagogical model (Wellington & Szczerbinski, 2022). Moreover, data collection was carried out using an online survey.

2.2 Respondents

The respondents of this study are 230 diploma-level undergraduates from Universiti Teknologi MARA (UiTM). All the respondents are indigenous students pursuing Foundation Mandarin or Foundation Arabic courses (levels I and II). Although the respondents were pursuing different third language courses, Mandarin and Arabic respectively, they were analysed as one group because the aim of the study was to explore general learners' perceptions and challenges in AI-assisted third language learning. The study did not aim to compare the linguistic demands of individual languages. Hence, the grouping was justified by the respondents' shared learning context as Malaysian higher education students learning a third language with AI support.

The sampling method adopted in this study was cluster random sampling. This method was deemed suitable because the respondents were already grouped into predetermined clusters based on course and proficiency level. The total population comprised students from the Faculty of Business Management who were enrolled in Foundation Arabic and Foundation Mandarin courses in the current semester (October 2025). To sample pre-existing class cohorts individually—specifically Foundation Arabic and Mandarin students across Levels I and II, this research employed a cluster random sampling method. This yielded a 97.4% response rate with 230 total participants. A demographic breakdown reveals 97 Arabic learners and 133 Mandarin learners, with 176 enrolled at the Level I proficiency stage and 54 at Level II.

2.3 Research Instrument

The research instrument was designed and adapted from Moulieswaran and Prasantha Kumar (2023) and transformed into an online survey via Google Form. The survey items were modified and tailored to suit the context of this study while retaining the existing item content and structure. The survey contained three major parts; demographic information such as age, gender, ethnicity and mother tongue language, second part included the background information on the use of AI and the last part consisted of information on perception and challenges while using AI to cater language learning. Responses in part three of this survey were recorded on a five-point Likert scale, ranging from 1 (Strongly Disagree, SD) to 5 (Strongly Agree, SA). Descriptive statistics were then applied to calculate the mean and standard deviation, with the final mean scores interpreted based on the framework (Table 1) established by Best (1981).

Table 1

The Interpretation of the Degree of Agreement

Students Level	Mean
Lowest	1.00 -1.50
Low	1.51 - 2.50
Moderate	2.51 - 3.50
High	3.51 - 4.50
Highest	4.51 - 5.00

2.4 Instrument Reliability and Validity

To evaluate the instruments' internal consistency, the reliability was measured using a Cronbach's alpha. Based on the guideline by Ahmad et. al. (2024), alpha value ranging from 0.7 to 0.9 denote an acceptable to excellent level of reliability. As illustrated in Table 2, the perception items achieved a strong reliability score of .918, while the challenge items regarding AI-assisted third language learning demonstrated acceptable internal consistency at .733. Overall, the scales measuring both constructs proved to be highly reliable. These figures are consistent with the previous study by Moulieswaran and Prasantha Kumar (2023), which recorded alpha value of .791 and .754 respectively. Finally, pedagogical experts reviewed the adapted survey to ensure content validity. Their assessment confirmed that the items accurately targeted the study's prime constructs and were highly appropriate for the targeted Arabic and Mandarin contexts.

Table 2

The Reliability of Learners' Perception and Challenges Towards AI-assisted Third Language Learning

Reliability	Number of items	Cronbach's alpha
Perceptions	10	.918
Challenges	10	.733

2.5 Data Analysis

Data analysis was carried out by using IBM SPSS Statistics Software. The survey results were synthesised using descriptive statistics, including standard deviations and means, before being tabulated for in-depth comparison.

2.6 Ethical Considerations

This study adhered strictly to recognised ethical protocols. Prior to initiating the Google Form survey, respondents were informed about the aims of the study, the methods of the study, the voluntary nature of their engagement, and their rights to withdraw without any penalty. Consent was gathered upfront, and the participants anonymity was ensured by omitting personal identifiers such as names and students' ID. Furthermore, the collected data was restricted to academic use and stored in secure, password-protected files, ensuring that the research team maintained stringent compliance with data privacy and confidentiality standards.

3. Results

3.1 Respondent Demographics

By referring to Table 3, the demographic profile of the 230 students enrolled in Levels I and II of Foundation Mandarin and Foundation Arabic reveals a predominantly female cohort (78.3%, n=180) while male 21.7%, n=50. The vast group of these learners (96.1%, n=221) fell within the 18 to 20 age group. Ethnically, the participants were diverse, 41.3% (n=95) are Malay students and 58.7% (n=135) are students from other ethnic groups. Moreover, regarding first languages, Malay was the predominant mother tongue (58.2%, n=134), while 39.6% (n=91) spoke other indigenous languages like Iban, Melanau, and Bidayuh. A mere 2.2% (n=5) of the total sample reported to have English as their mother tongue.

Table 3

The Respondents' Demographics Background

		Frequency	Percentage
Gender	Male	50	21.7
	Female	180	78.3
Age	Under 18 years old	4	1.7
	18-20 years old	221	96.1
	21-23 years old	5	2.2
Ethnicity	Malay	95	41.3
	Others	135	58.7
Mother tongue	Malay	134	58.2
	English	5	2.2
	Others	91	39.6

3.2 AI Tools Usage Patterns

Table 4 depicts how learners interact with AI for a third language learning environment. A majority of the respondents (51.7%, n=119) used AI tools multiple times a week, and smartphones were the most popular device, used by 77.0% (n=177) of the respondents. Meanwhile, 73.0% (n=168) of the respondents felt reasonably confident utilising these tools, most were at Level I proficiency (76.5%, n=176), with Level II representing 23.5% (n=54).

Table 4

Learners' Engagement with AI for Third Language Learning

		Foundation Arabic (n)	Foundation Mandarin (n)	Frequencies	Percentage
Frequency of using AI tools for learning third language	Daily	14	11	25	10.9
	Several times	54	65	119	51.7
	Once a week	19	23	42	18.3
	Occasionally	10	32	42	18.3
	Other	0	2	2	0.9
Primary device for AI-assisted third language learning	Smartphones	77	100	177	77.0
	Laptop/PC	12	21	33	14.3
	Tablet	8	12	20	8.7
Confidence in using technology for third language learning	Low	3	9	12	5.2
	Moderate	67	101	168	73.0
	High	27	23	50	21.7
Proficiency level	Level I	79	97	176	76.5
	Level II	18	36	54	23.5

3.3 Perceptions of AI-Assisted Third Language Learning

Table 5 presents the mean score for items measuring learners' perceptions of the benefits of AI in third language learning. With an overall mean of 3.73 (SD=.573), the results show a consistently positive view of AI in L3 learning. The highest agreement was for Item 8, suggesting that students highly value the immediate responses AI provides through internet connectivity. As presented in Table 4, Items 3, 2, and 6 share the same mean score; however, their standard deviation varies. Given that the standard deviation of Item 3 is slightly higher than those of Items 2 and 6, Item 3 ranked second, closely followed by Items 2 and 6. The mean score for Item 3 is 3.83 (SD=.747), which confirms that learners held a positive perception of AI applications for third language learning as they conserve time. The third position is held by Item 2, which shows that learners' perceptions of the utility of AI-based application are high (M= 3.83, SD=.731). Item 6 ranked fourth (M= 3.83, SD= .715). This finding revealed that learners think AI-driven applications can supply them with relevant materials to study a third language in convenient locations whenever they choose.

The mean score for item 7 is 3.79 (SD=.741), ranking it fifth. It demonstrated that learners believe that AI applications in smartphones are advantageous for learning a third language. The findings in Table 5 showed that Item 1 ranked sixth, indicating that students can obtain dependable third language learning experiences from AI-powered applications (M=3.74, SD=.749). The findings indicate general agreement that AI improves engagement (Item 9) and interactive learning (Item 10). Even though ratings for cost effectiveness (Item 5) and skill development (Item 4) were slightly lower,

they remained positive. Consequently, despite cost-related considerations, AI is widely recognised as an instrumental asset offering adaptable, swift, and effective support for third language acquisition.

Table 5

The Learners' Perception towards using AI Assistance in Third Language Learning

Item No.	Items	Mean	Standard Deviation	Level of agreement
8	AI applications with good internet connectivity provide instant responses anytime and anywhere.	3.86	.786	High
3	The benefit of utilising AI-powered applications for third language learning is that it saves time.	3.83	.747	High
2	AI-based applications are user friendly and easy to use.	3.83	.731	High
6	Applications driven by artificial intelligence provide students the opportunity to learn a third language anywhere, at any time.	3.83	.715	High
7	There are a few AI applications available on smartphones that are beneficial for learning a third language.	3.79	.741	High
1	AI-powered applications allow me to access reliable third language learning tasks.	3.74	.749	High
9	Apps with AI technologies will improve third language learning in an engaging way.	3.67	.757	High
4	Various third language skills can be learned using AI applications.	3.65	.794	High
10	Using AI-based apps facilitates interactive third language learning activities.	3.62	.725	High
5	Some AI applications are cost-effective for third language learning.	3.56	.767	High
	Total	3.73	.573	High

3.4 Challenges in AI-Assisted Third Language Learning

Table 6 demonstrates the mean scores and the agreement levels for the perceived challenges among third language learners. The overall mean across all challenge items was moderate ($M=3.16$, $SD=.481$). The challenges can be categorized by third language learners' perceived severity. Poor internet connectivity is considered the primary hurdle for third language learners, with a mean score of 4.00 ($SD=.884$). This finding indicated that internet connectivity issues could reduce their engagement with AI apps. Following Item 1, Item 8 recorded the second highest mean score ($M=3.87$, $SD=.969$) indicating that slow internet speed might hinder third language learners from receiving immediate responses from AI apps. A cluster of items received moderate agreement, comprising Items 2, 9, 10, 6, 7, 5, and 3. Item 2 had a mean score of 3.42 ($SD=.911$). This finding revealed that students employ AI applications for personal rather than educational purposes. Following this is Item 9 ($M=3.37$, $SD=.929$) which confirms that AI applications are costly. Item 10 also showed moderate agreement with a mean score of 3.16 ($SD=.745$). This finding revealed a shortage of AI tools specifically designed for third languages.

The mean score of Item 6 indicated that students moderately agreed that data expenses are considerable when utilising AI-driven applications ($M=3.00$, $SD=.942$). Item 7 indicated that third language learners also moderately agreed that they have less familiarity with AI-powered applications ($M=2.99$, $SD=.771$). Additionally, Item 5 demonstrated that students somewhat agreed that the battery life of the devices they use can be problematic during interaction with AI-powered applications ($M=2.76$, $SD=.953$). Item 3 likewise received moderate agreement from learners, suggesting that AI app characteristics do not support third language learning ($M=2.75$, $SD=.865$). This finding indicates that learners do not perceive the quality or design of available apps as a major impediment to third language learning. Item 4 recorded the lowest mean score ($M=2.32$, $SD=.892$), indicating that learners disagreed that smartphone apps lack effective AI tools for L3 learning. In general, students faced moderate challenges when integrating AI into their third language studies. The most significant barriers identified were inadequate internet connectivity and slow network speeds. Conversely, issues such as expensive data plans, lack of third language specific applications and the distraction of non-academic AI use were deemed less impactful. More importantly, the respondents did not view the availability or the quality of AI smartphone applications as significant barriers to their learning contexts.

Table 6

The Challenges Encountered in AI-assisted Third Language Learning Environments

Item No.	Items	Mean	Standard Deviation	Level of agreement
1	Poor internet connectivity leads to less interaction with AI applications.	4.00	.884	High
8	To receive an immediate answer, slow internet speed becomes a bigger issue.	3.87	.969	High
2	AI applications are being used by individuals for non-academic purposes.	3.42	.911	Moderate
9	AI-powered apps are quite expensive.	3.37	.929	Moderate
10	There is currently a shortage of AI-powered tools for third language learning.	3.16	.745	Moderate
6	Data cost is very high when using any-AI powered applications.	3.00	.942	Moderate
7	Less familiarity among students with utilizing AI applications for third language instruction.	2.99	.771	Moderate
5	Battery life becomes a problem when interacting with AI applications.	2.76	.953	Moderate
3	Third language learning is not supported by the characteristics of AI apps.	2.75	.865	Moderate
4	Smartphones do not have good AI apps for third language learning.	2.32	.892	Low
Total		3.16	.481	Moderate

4. Discussion

This section consolidates the main findings of this research and examines the AI-mediated pedagogical model developed from these outcomes. Broadening the current literature on AI-mediated instruction, this study shifts the focus from ESL to third language acquisition in Mandarin and Arabic. The findings reveal that learners regularly engage with AI tools where necessary, largely through their smartphones, underscoring mobile learning's important role in higher education (Naveed et al., 2023; Li et al., 2022). However, because learners reported only moderate confidence in utilising these tools, the results emphasise that maximising AI's educational benefits still requires strong teacher guidance and robust institutional support (Ajani et al., 2025).

The second objective of this study was to explore third language (L3) learners' perceptions of artificial intelligence (AI). The findings revealed that learners generally have positive perceptions of the use of artificial intelligence (AI) for third language acquisition, especially regarding immediacy, timesaving, and flexibility. The results revealed the unique characteristics of third language learning contexts, where multilingual students rely heavily on flexible and self-directed learning assistance because of restricted target-language exposure outside of the classroom. This finding supports other studies that show learners generally have positive attitudes towards AI-assisted language learning. For instance, Chinese EFL learners exhibit positive emotions such as motivation, excitement, engagement, and confidence when using AI in their classes (Xin & Derakhshan, 2025). Moreover, real-time feedback and personalised learning provided by AI tools help improve learners' learning efficacy and save time (Chen et al., 2025; Torres & Statti, 2025; Alqaed, 2024). For example, AI tools that provide real-time feedback, like grammar checkers and speech assessment tools, improve learning efficiency (Bahari, 2026; Chen et al., 2025). In addition, AI technologies offer learners the opportunity to practice their language skills anywhere, at any time, thereby improving the learning experiences through a flexible learning environment which is particularly important for language learners who have other commitments (Almelhes, 2023).

Although AI tools are perceived as positive, their cost-effectiveness remains a concern. Some studies indicate the need to ensure equitable access to AI tools, which may be a limitation in some settings (Torres & Statti, 2025; Wang et al., 2025). However, AI is perceived to be a valuable resource for improving language learning (Abed et al., 2025). Although AI tools are effective in improving language learning skills such as writing and speaking, some limitations have been reported, including over reliance on technology and a need to reduce human interaction (Alqaed, 2024; Kazemi, 2026; Lee & Jeong, 2026). The learners perceive the cognitive and emotional benefits of AI tools but need to ensure a balance between AI and traditional learning methods (Lee & Jeong, 2026). Overall, the general acceptability of AI as a facilitator in language learning is evident. For instance, language learners express high levels of satisfaction with AI, self-efficacy, and strong intentions to reuse AI for language learning (Almusharraf et al., 2025). The value that AI offers language learners, particularly its capacity for personalised feedback, is highly appreciated (Bahari, 2026; Zou et al., 2026).

In the third objective of this study, the aim was to examine the challenges encountered by L3 learners. It was revealed that L3 learners encountered moderate difficulty using AI to assist their third language learning. It was revealed that L3 learners experience difficulties due to poor internet connectivity and slower network speeds, which are major challenges to the effectiveness of AI tools in assisting L3 learning (Ramesh, 2025; Wafa'A et al., 2025). The results showed that L3 learners face different technological challenges, which are also common among L3 learners (Ramesh, 2025). For example,

problems such as accent recognition and other problems related to AI applications are identified as obstacles to L3 learning (Wafa'A et al., 2025). The results also showed that the cost of AI applications could be a potential obstacle to L3 learning, but this was not often identified as an obstacle (Ramesh, 2025). The results also showed that there is a lack of AI applications to support third language learning (Al Fryan, 2024).

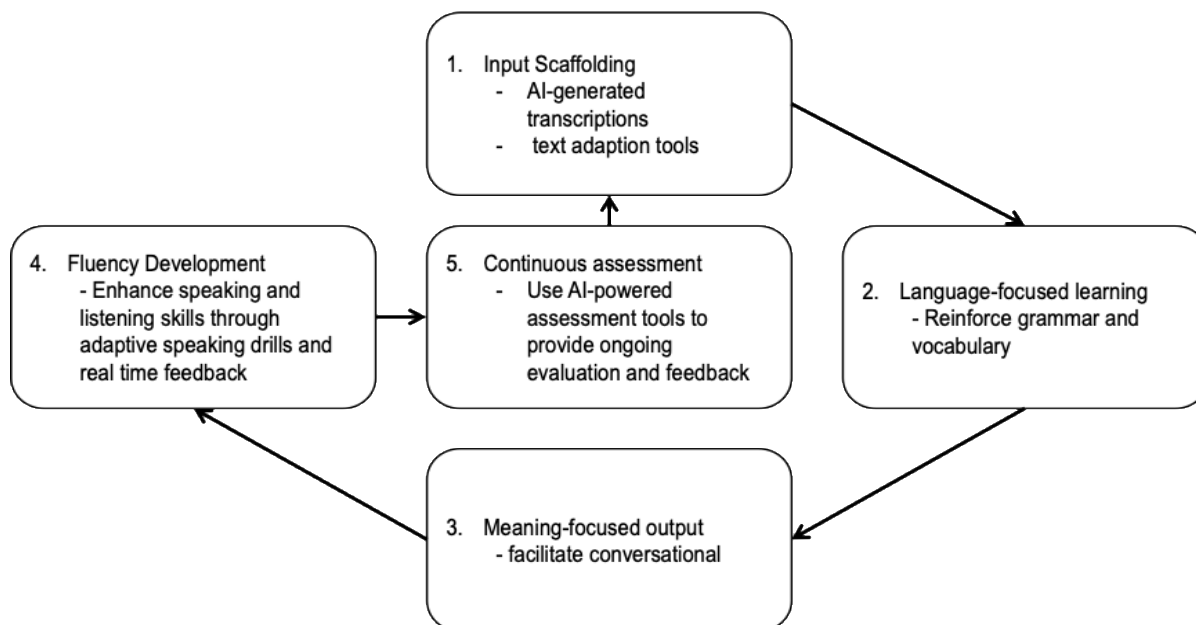
Consequently, the results indicate an association between learners' positive perceptions of AI and the practical barriers they experienced in using AI for L3 learning. This suggests that the usefulness of AI in L3 learning is conditional. AI can support learning effectively when learners have access to stable internet connections, affordable data, suitable devices, and relevant learning tools. However, when these conditions are limited, learners may not fully benefit from AI features such as instant feedback, flexible access, and interactive practice. These barriers may reduce learners' interaction with AI applications and limit the actual effectiveness of AI-assisted learning, particularly in Mandarin and Arabic learning contexts. Collectively, although AI is not a major challenge, the application of AI tools for non-academic purposes is acknowledged, which can have a negative effect on their use in academics (Huertas-Abril & Hà, 2024). Nevertheless, the standard of AI apps installed on smartphones is not a major challenge. This confirms previous studies that found AI tools like chat bots and language learning apps are well-accepted and effective in enhancing language skills (Soon et al., 2024). The above findings provide a holistic view of the patterns, perceptions and challenges of the learners in applying AI for third language learning.

4.1 The Preliminary AM-L3 Pedagogical Model

Based on the findings of this study, a model known as the preliminary AI-Mediated Third Language Learning (AM-L3) pedagogical model is proposed, as shown in Figure 1. The model is presented as a preliminary pedagogical proposal derived from learners' reported perceptions and challenges, rather than as an empirically validated model. The preliminary AM-L3 pedagogical model conceptualises artificial intelligence as a supportive instructional tool that can assist language learning through structured stages of pedagogical integration. The survey findings support the need for such a model, as learners generally perceived AI positively in terms of instant response, time saving, ease of use, mobile access, interactive learning, and language learning support. During the data analysis, items with identical mean scores were ranked as tied. For example, Item 8 was the top result, indicating that AI is most valued for providing swift responses when internet access is stable and fast. Items 3, 2, and 6 are tied for the next position, showing that learners similarly value AI for its time-saving qualities, user-friendliness, and flexibility. However, challenges like connectivity issues, expenses, and limited specialized tools suggest that integration must be paired with lecturer support and facility readiness.

Figure 1

The Proposed Preliminary AI-Mediated Third Language Learning (AM-L3) Pedagogical Model



The initial phase of the model termed 'Input Scaffolding' is grounded in the finding that learners consider AI highly beneficial for delivering immediate feedback and response as well as dependable academic support. During this stage, learners engage with AI-generated transcriptions and modified texts designed to bridge gaps in their comprehension of the target language. This targeted scaffolding is particularly vital for students of Mandarin and Arabic, who often need extra assistance navigating novel vocabulary, difficult scripts, and unfamiliar phonetics and syntactic structures. Nevertheless, since this immediate support relies on a consistent internet connection, this phase also underscores the necessity of resolving the connectivity challenges highlighted by the participants in this study. The second phase is termed as 'Language-focused Learning', which highlighted on reinforcing grammar and vocabulary through AI-driven responses. This stage relies on the perspective that AI tools are both efficient and easy to use for developing language skills. However,

because the survey revealed only moderate confidence among the learners, instructor's support is still needed and deemed reasonable for helping the learners to properly interpret and apply AI feedback in their academic work.

The 'Meaning-focused Output' phase incorporates AI chatbots to facilitate conversational practices. This integration is supported by results indicating that AI is both captivating and easily accessible, especially through smartphones. Because mobile devices serve as the main portal for access, it is crucial that learning activities are tailored for mobile platforms. Furthermore, teachers play an important role in directing learners to use AI for educational purposes rather than solely for social interactions. In the 'Fluency Development' stage, learners use adaptive drills and real-time feedback to improve oral skills. This approach capitalizes on the recognised advantages of AI's immediacy and efficiency. However, although these capabilities facilitate consistent practice, their overall effectiveness can be impeded by technical errors, such as slow internet speeds, high data cost, and scarcity of specialized resources for Mandarin and Arabic.

Finally, 'Continuous Assessment' uses AI to monitor learner's progress. Although learners appreciate the interactive assistance that AI could afford, practical hurdles such as internet connectivity and financial costs require careful management. Crucially, teacher and instructor oversight is necessary to ensure AI assessments are utilised ethically and align with fundamental learning outcomes. The proposed AM-L3 framework promotes a structured, five-stage methodology for integrating AI into third language education. It recognises that the overall effectiveness of AI is heavily dependent on the variables such as mobile accessibility, stable internet connectivity, and active instructor or teacher involvement. Moving forward, researchers should focus on validating this framework by conducting experimental studies or practical classroom trials.

5. Conclusion

This study offers a clear view into learner's perception and the practical challenges they encounter when using AI for third language acquisition. While there is a strong positive attitude toward AI's efficiency and user-friendliness, learners concurrently face moderate hurdles like bad internet connectivity, high subscription costs, and non-academic distractions. The resulting Preliminary AI-Mediated Third Language Learning (AM-L3) pedagogical model frames AI as a guided tool to scaffold structured learning in both Mandarin and Arabic circumstances. Practical recommendations consist of institutional improvements to internet access and data affordability to ensure consistent tool use. AI activities should be mobile-ready because smartphones are the primary device used by the learners. Furthermore, teachers should provide guidance to keep students focused on academic goals and promote ethical, meaningful engagement with AI.

The findings of this study also provide several important implications for language education. First, AI-assisted learning has the potential to enhance learners' engagement, motivation, and willingness to communicate through personalised learning experiences and real-time feedback. Further, AI technologies can support language learning processes such as vocabulary development, grammar acquisition, pronunciation practice, and speaking skills development. Consequently, AI-assisted learning environments can foster self-regulated learning by enabling learners to access subject materials and feedback at their own pace. Lastly, the integration of AI technologies into language learning requires appropriate pedagogical support from educators. Language educators need adequate training to effectively integrate AI technologies into their teaching practices. Educator training programmes should emphasise the development of digital pedagogical competencies to enable educators to effectively mediate AI-assisted learning environments.

However, there are several limitations that should be considered in future studies. This research focused on Mandarin and Arabic learners at a single university, so the results may not reflect all third language students in Malaysia. While treating both languages as a single group allows for general insights, they have very different linguistic requirements. Future research should compare these groups to see if AI's impact varies by specific language traits. Future studies should investigate which skills are best supported by AI versus those requiring human instruction. This comprises specific areas like Mandarin tones or Arabic verb conjugation. Such insights will assist educators combine AI and classic methods more effectively. Additionally, further research is needed to validate the AM-L3 model and refine measurement tools for third language contexts.

Funding

This study was not supported by any grants from funding bodies in the public, private, or non-profit sectors.

Conflict of Interest

The authors declare no conflicts of interest.

CRedit Authorship Contribution Statement

Ting Hie Ling: Project administration; Conceptualisation; Investigation; Data curation; Writing - original draft; Resources

Tang Howe Eng: Methodology; Writing- review & editing; Validation; Supervision

Siti Faridah Kamaruddin: Writing - original draft; Writing- review & editing

Nur Nadia Qausar Juhari: Writing- review & editing; Writing- review & editing

Muhammad Anas Abdul Razak: Investigation, Writing- review & editing; Resources

Lam Kai Chee: Conceptualization; Visualisation; Writing- review & editing; Resources

Availability of Data and Materials

The data supporting this study's findings are available on request from the corresponding author.

Generative Artificial Intelligence Declarations

The authors used ChatGPT and Grammarly to assist with language editing, grammar checking, and improving readability. The AI tools did not contribute to the study design, data collection, data analysis, interpretation of findings, or the generation of scientific content. All outputs generated by AI were carefully reviewed, verified, and edited by the authors, who take full responsibility for the accuracy, integrity, and originality of the manuscript.

References

- Abed, I. N., Al-Tamimi, R. S. A., Ghanim, K. S., & Nashmi, B. H. (2025). A Qualitative Study of English Language Teachers' Perceptions on Teaching English Language Through Artificial Intelligence in Public Education in Iraq. *Intelligent Systems, Blockchain, and Communication Technologies*, 125–136. https://doi.org/10.1007/978-3-031-82377-0_11
- Ahmad, N., Alias, F. A., Hamat, M., & Mohamed, S. A. (2024). Reliability analysis: Application of Cronbach's alpha in research instruments. *SIG: e-Learning@CS*, 114–119. <https://appspenang.uitm.edu.my/sigcs/>
- Ajani, O. A., Gamede, B., & Matiyenga, T. C. (2025). Leveraging artificial intelligence to enhance teaching and learning in higher education: Promoting quality education and critical engagement. *Journal of Pedagogical Sociology and Psychology*, 7(1), 54–69. <https://doi.org/10.33902/jpsp.202528400>
- Al Fryan, L. H. (2024). Utilization of technologies in French language translation (FLT) education in Saudi Arabia: A quantitative survey study. *Heliyon*, 10(16), Article e36436. <https://doi.org/10.1016/j.heliyon.2024.e36436>
- Alava-Arboleda, J. A., Saraguro-Reyes, J. F., Zambrano, J., & Castellanos, E. X. (2025, November). The impact of artificial intelligence on second language acquisition experiences. In J. Buele, G. Palacios-Navarro, & F. Avilés-Castillo (Eds.), *International conference on emerging technologies and educational innovation* (pp. 179–192). Springer Nature Switzerland. https://doi.org/10.1007/978-3-032-10310-9_12
- Alharthi, S. M. (2024). Beyond traditional language learning: EFL student views on ChatGPT in Saudi Arabia. *Arab World English Journal (AWEJ)*, Special Issue on CALL 10, 15–35. <https://doi.org/10.24093/awej/call10.2>
- Aliyeva, N., Orujova, N., Aliyeva, G., Asgarova, G., & Oksanen, L. (2026). Integrating artificial intelligence in higher education language teaching: Insights from academic discourse. *Qubahan Academic Journal*, 6(2), 338–354. <https://doi.org/10.48161/qaj.v6n2a2527>
- Aljabr, F., Zakarneh, B., Annamalai, N., & Al Said, N. (2025). Integrating AI: Challenges and opportunities in teaching English writing skills. *World Journal of English Language*, 15(5), Article 371. <https://doi.org/10.5430/wjel.v15n5p371>
- Almelhes, S. A. (2023). A review of artificial intelligence adoption in second-language learning. *Theory and Practice in Language Studies*, 13(5), 1259–1269. <https://doi.org/10.17507/tpls.1305.21>
- Almusharraf, A., Bailey, D., Almusharraf, N., & Alotaibi, T. (2025). Students' perceptions of generative AI in EFL writing: Strategies, self-efficacy, satisfaction and behavioural intention. *Australasian Journal of Educational Technology*, 41(5), 18–36. <https://doi.org/10.14742/ajet.10045>
- Alqaed, M. A. (2024). AI in English language learning: Saudi learners' perspectives and usage. *Advanced Education*, 12(25), 125–142. <https://doi.org/10.20535/2410-8286.318972>
- Amini, M., Zahabi, A., & Ganapathy, M. (2025). Benefits and challenges of integrating AI tools in language education. In P. H. P. Vu (Ed.), *Implementing AI tools for language teaching and learning* (pp. 84–104). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-7260-9.ch005>
- Bahari, A. (2026). Evaluating the effectiveness of AI-driven approaches on EFL learners' expository writing skills. *TESOL Journal*, 17(1), Article e70099. <https://doi.org/10.1002/tesj.70099>
- Bardel, C., & Sánchez, L. (Eds.). (2020). *Third language acquisition: Age, proficiency and multilingualism*. Language Science Press. <https://langsci-press.org/catalog/book/268>
- Barrios-Beltran, D. (2024). Enriching the teaching-learning experience by using AI tools in the L2 classroom. In F. Pan (Ed.), *AI in language teaching, learning, and assessment* (pp. 61–77). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-0872-1.ch004>
- Best, J. W. (1981). *Research in education* (4th ed.). Prentice-Hall.
- Biju, N., Abdelrasheed, N. S. G., Bakiyeva, K., Prasad, K. D. V., & Jember, B. (2024). Which one? AI-assisted language assessment or paper format: An exploration of the impacts on foreign language anxiety, learning attitudes, motivation, and writing performance. *Language Testing in Asia*, 14(1), Article 45. <https://doi.org/10.1186/s40468-024-00322-z>
- Bittle, K., & El-Gayar, O. (2025). Generative AI and academic integrity in higher education: A systematic review. *Information*, 16(4), Article 296. <https://doi.org/10.3390/info16040296>
- Chen, H. J., Hsieh, F. C., & Yen, Y. C. (2025). Applying AI technologies in second language learning. In Y. J. Lan, G. Y. Qi, & D. Chun (Eds.), *AI-mediated language education in the metaverse era* (pp. 101–118). Springer Nature Singapore. https://doi.org/10.1007/978-981-95-0245-5_6

- Chua, N. A., Ahmad, M. B., Ismail, I. L. M., Mutalib, N. B. A., Saputra, J., Soon, G. Y., & Leng, N. K. (2024). Technology integration in learning Mandarin Chinese as a foreign language in Malaysia and Germany. *International Journal of Advanced and Applied Sciences*, 11(9), 192–202. <https://www.science-gate.com/IJAAS/Articles/2024/2024-11-09/1021833ijaas202409021.pdf>
- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE Publications.
- Darda, P., & Pendse, M. K. (2025). The impact of artificial intelligence (AI) transformation on the financial sector from the trading to security operations. In A. Khang (Ed.), *Shaping cutting-edge technologies and applications for digital banking and financial services* (pp. 322–339). Productivity Press. <https://doi.org/10.4324/9781003501947-20>
- Dinata, R. P., Suryati, N., Jailani, M. K., Keli, Y. P., Rovikasari, M., & Hasymi, M. (2025). Exploring rural EFL lecturers' perspectives on the integration of artificial intelligence (AI) in foreign language pedagogy. *LEARN Journal: Language Education and Acquisition Research Network*, 18(2), 633–654. <https://doi.org/10.70730/OVMA8060>
- Fathi, J., Rahimi, M., & Derakhshan, A. (2024). Improving EFL learners' speaking skills and willingness to communicate via artificial intelligence-mediated interactions. *System*, 121, Article 103254. <https://doi.org/10.1016/j.system.2024.103254>
- Gazaille, M. (2023). *Artificial intelligence: The views of tertiary-level foreign language learners*. HAL (Le Centre pour la Communication Scientifique Directe). https://doi.org/10.2991/978-2-494069-25-1_32
- Homer, S. T., Chuen, P. W., & Chuah, C. (2025). The role of AI in education: A Southeast Asian student perspective through a unified theory of acceptance and use of technology lens. *Asia Pacific Journal of Education*, 1–28. <https://doi.org/10.1080/02188791.2025.2564138>
- Huertas-Abril, C. A., & Hà, T. A. (2024). Opportunities and challenges of using artificial intelligence in language education: Perspectives from Vietnam. In M. Lee & D. Tafazoli (Eds.), *Computer-assisted language learning in the Global South* (pp. 81–98). Routledge. <https://doi.org/10.4324/9781003495956-7>
- Kasap, S. (2024). Enhancing English language teaching with artificial intelligence: A meta-analysis of research studies. In Y. Özkan, H. Tuncer, & E. Bada (Eds.), *An approach to digitalization in language teaching from different perspectives: A reflection of empirical work* (pp. 75–88). Nova Science Publishers. <https://doi.org/10.1016/j.actpsy.2025.105649>
- Kazemi, F. (2026). The effect of artificial intelligence on English learners' anxiety levels. In A. Shukla, B. Meeprom, K. Khunasathitchai, & N. Yadav (Eds.), *AI-powered English teaching* (pp. 309–328). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3373-1952-0.ch010>
- Kelly, S., Kaye, S.-A., & Oviedo-Trespalacios, O. (2023). What factors contribute to the acceptance of artificial intelligence? A systematic review. *Telematics and Informatics*, 77, Article 101925. <https://doi.org/10.1016/j.tele.2022.101925>
- Lee, Y.-J., & Jeong, S.-H. (2026). Implementing AI-integrated English writing: University English language learners' writing strategies and perceptions. *International Journal of Evaluation and Research in Education (IJERE)*, 15(1), 805–814. <https://doi.org/10.11591/ijere.v15i1.35461>
- Lee, Y.-J., Davis, R. O., & Choi, J.-I. (2025). Integrating generative AI into EFL writing: University students' strategies and perceptions. *Online Journal of Communication and Media Technologies*, 15(4), Article e202541. <https://doi.org/10.30935/ojcm/17545>
- Li, F., Fan, S., & Wang, Y. (2022). Mobile-assisted language learning in Chinese higher education context: A systematic review from the perspective of situated learning theory. *Education and Information Technologies*, 27(7), 9665–9688. <https://doi.org/10.1007/s10639-022-11025-4>
- Ling, L. Y., Kaur, N., & Cheong, W. H. (2022). Task-based language teaching involving authentic situations at a Malaysian institution of higher learning. *Journal of Institutional Research South East Asia*, 20(1), 53–75. https://www.seairweb.info/journal/articles/JIRSEA_v20_n01/JIRSEA_v20_n01_Article03.pdf
- Maltseva, S. N., & Pavlova, A. Y. (2025, March). Analyzing the potential of AI-powered writing evaluation tools for developing students' analytical skills. In *2025 systems of signals generating and processing in the field of on board communications* (pp. 1–6). IEEE. <https://doi.org/10.1109/IEEECONF64229.2025.10948096>
- Mat Yusoff, S., Mohamad Marzaini, A. F., Hao, L., Zainuddin, Z., & Basal, M. H. (2025). Understanding the role of AI in Malaysian higher education curricula: An analysis of student perceptions. *Discover Computing*, 28, Article 62. <https://doi.org/10.1007/s10791-025-09567-5>
- Mohamed, M. S. P. (2024). Exploring ethical dimensions of AI-enhanced language education: A literature perspective. *Technology in Language Teaching & Learning*, 6(3), 1–11. <https://doi.org/10.29140/tltd.v6n3.1813>
- Moulieswaran, N., & Prasantha Kumar, N. S. (2023). Investigating ESL Learners' Perception and Problem towards Artificial Intelligence (AI) -Assisted English Language Learning and Teaching. *World Journal of English Language*, 13(5), 290. <https://doi.org/10.5430/wjel.v13n5p290>
- Naveed, Q. N., Choudhary, H., Ahmad, N., Alqahtani, J., & Qahmash, A. I. (2023). Mobile learning in higher education: A systematic literature review. *Sustainability*, 15(18), Article 13566. <https://doi.org/10.3390/su151813566>

- Nazari, N., Shabbir, M. S., & Setiawan, R. (2021). Application of artificial intelligence powered digital writing assistant in higher education: Randomized controlled trial. *Heliyon*, 7(5), Article e07014. <https://doi.org/10.1016/j.heliyon.2021.e07014>
- Ng, D. T. K., Chan, E. K. C., & Lo, C. K. (2025). Opportunities, challenges and school strategies for integrating generative AI in education. *Computers and Education: Artificial Intelligence*, 8, Article 100373. <https://doi.org/10.1016/j.caeai.2025.100373>
- Park, J. (2025). A systematic literature review of generative artificial intelligence (GenAI) literacy in schools. *Computers and Education: Artificial Intelligence*, 9, Article 100487. <https://doi.org/10.1016/j.caeai.2025.100487>
- Radzuan, F. A. A., & Arif, M. M. (2025). Integrating artificial intelligence into language teaching approaches: A systematic review of flipped classrooms. *International Journal of Language Education and Applied Linguistics*, 15(2), 44–58. <https://doi.org/10.15282/ijleal.v15i2.11943>
- Ramesh, M. R. (2025). Challenges of integrating artificial intelligence with language curriculum: Addressing pedagogical, technological, and ethical barriers. In J. Nayef (Ed.), *Modern methods for AI-integrated language curriculum* (pp. 205–230). Information Science Reference. <https://doi.org/10.4018/979-8-3693-9606-3.ch008>
- Sadouki, F. (2025). Cross-linguistic influence in third language: Examples from students' written production. *Bellaterra Journal of Teaching & Learning Language & Literature*, 18(2), Article 1348. <https://doi.org/10.5565/rev/jtl3.1348>
- Salas-Pilco, S. Z., & Yang, Y. (2022). Artificial intelligence applications in Latin American higher education: A systematic review. *International Journal of Educational Technology in Higher Education*, 19, Article 26. <https://doi.org/10.1186/s41239-022-00326-w>
- Sarwanti, S., Sariasih, Y., Rahmatika, L., Islam, M. M., & Riantina, E. M. (2024). Are they literate on ChatGPT? University language students' perceptions, benefits and challenges in higher education learning. *Online Learning*, 28(3), 105–130. <https://files.eric.ed.gov/fulltext/EJ1446718.pdf>
- Shafiee Rad, H. (2024). Revolutionizing L2 speaking proficiency, willingness to communicate, and perceptions through artificial intelligence: A case of Speeko application. *Innovation in Language Learning and Teaching*, 18(4), 364–379. <https://doi.org/10.1080/17501229.2024.2309539>
- Soon, G. Y., Abdullah, N. A. C. B., Suyan, Z., & Yiming, C. (2024). Integrating AI chatbots in ESL and CFL instruction: Revolutionizing language learning with artificial intelligence. *LatIA*, (2), Article 6. <https://dialnet.unirioja.es/servlet/articulo?codigo=9873188>
- Sun, X., Dou, W., & Yang, Y. (2025). The socio-emotional dangers of using artificial intelligence (AI) technologies in second language (L2) education: Unveiling Chinese EFL teachers' perceptions and experiences. *Acta Psychologica*, 261, Article 105956. <https://doi.org/10.1016/j.actpsy.2025.105956>
- Tekman, İ., & Tekman, T. K. (2025). AI-assisted vs. teacher-based assessment of EFL students' writing: A comparative study. *Pedagogika*, 160(4), 23–39. <https://www.cceol.com/search/article-detail?id=1412594>
- Torres, K. M., & Statti, A. (2025). Leveraging AI tools for language learning activities. In P. H. P. Vu (Ed.), *Implementing AI tools for language teaching and learning* (pp. 129–150). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-7260-9.ch007>
- Tran, N. T., Nguyen, T. T., & Tran, P. H. (2026). Transforming foreign language acquisition: A perception-based study on artificial intelligence in language education across Asia. *International Journal of TESOL Studies*, 8(2), 1–23. <https://doi.org/10.58304/ijts.250914>
- Wafa'A, H., Alshaikhi, T., Wahab, M. O. A., & Khasawneh, M. A. (2025). Evaluating AI applications for enhancing listening comprehension among EFL students in English language in real-world scenarios. *World Journal of English Language*, 15(6), Article 209. <https://ideas.repec.org/a/jfr/wjel11/v15y2025i6p209.html>
- Wan Adnan, W. M. S. (2025). Motivasi pelajar dalam penggunaan kecerdasan buatan untuk pembelajaran nahu Arab. *International Journal of Language Education and Applied Linguistics*, 15(2), 123–133. <https://doi.org/10.15282/ijleal.v15i2.12741>
- Wang, Y., Li, H., & Savaş, H. (2025). Under-resourced EFL students' perceptions about the causes and consequences of unfair AI-mediated education. *Journal of Education for Students Placed at Risk (JESPAR)*, 1–16. <https://doi.org/10.1080/10824669.2025.2599161>
- Wang, Y., Wu, J., Chen, F., Wang, Z., Li, J., & Wang, L. (2024). Empirical assessment of AI-powered tools for vocabulary acquisition in EFL instruction. *IEEE Access*, 12, 131892–131905. <https://doi.org/10.1109/ACCESS.2024.3446657>
- Wellington, J., & Szczerbinski, M. (2022). *Research methods for the social sciences* (2nd ed.). Bloomsbury Academic.
- Xin, Z., & Derakhshan, A. (2025). From excitement to anxiety: Exploring English as a foreign language learners' emotional experience in the artificial intelligence-powered classrooms. *European Journal of Education*, 60(1), Article e12845. <https://doi.org/10.1111/ejed.12845>
- Yang, M., Wu, X., & Deris, F. D. (2025). Exploring EFL learners' positive emotions, technostress and psychological well-being in AI-assisted language instruction with/without teacher support in Malaysia. *British Educational Research Journal*, 1–31. <https://doi.org/10.1002/berj.4184>

- Yu, J., & Qiu, B. (2026). Big data and AI in English language learning: Predicting student performance and identifying learning gaps. *Journal of Applied Science and Engineering*, 29(6), 1459–1470. [https://doi.org/10.6180/jase.202606_29\(6\).0013](https://doi.org/10.6180/jase.202606_29(6).0013)
- Yuan, L., & Liu, X. (2025). The effect of artificial intelligence tools on EFL learners' engagement, enjoyment, and motivation. *Computers in Human Behavior*, 162, Article 108474. <https://doi.org/10.1016/j.chb.2024.108474>
- Yulianto, B., Suwarno, P., Maneechukate, S., Carreca, I. N., Carreza, A. N., Wulandari, S., & Asteria, P. V. (2025). Culturally adaptive AI in BIPA classrooms: Learner voices and pedagogical implications. *E3S Web of Conferences*, 640, Article 02014. <https://doi.org/10.1051/e3sconf/202564002014>
- Zhai, X., & Chen, W. (2025). Unpacking beliefs and engagement in AI-assisted Chinese learning: A latent profile analysis of Malaysian Chinese as foreign language learners. *European Journal of Education*, 60(2), Article e70101. <https://doi.org/10.1111/ejed.70101>
- Zhang, C., & Lu, Y. (2021). Study on artificial intelligence: The state of the art and future prospects. *Journal of Industrial Information Integration*, 23, Article 100224. <https://doi.org/10.1016/j.jii.2021.100224>
- Zou, Y., Zhang, Y., Yu, X., Qian, J., Xu, N., & Zhang, T. (2026). Beyond instrumental use: A TAM-based study of AI-assisted language learning among Chinese university students. *Journal of Education and Training Studies*, 14(1), 79–93.