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Article

Transforming Foreign Language Acquisition: A Perception-Based Study on Artificial Intelligence in Language Education Across Asia

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Abstract
This study investigated the role of artificial intelligence (AI) in second language education (SLE) across Asia - a region marked by profound linguistic and cultural diversity. AI offers innovative tools to support language learning in these complex contexts. Applying a mixed-methods design, the study gathered quantitative data from more than 400 participants (386 learners and 48 educators) across multiple Asian countries, alongside qualitative feedback and a comprehensive literature review. The study examined the perceived effectiveness, accessibility, and cultural relevance of AI in language education. The findings indicated that among the AI tools available, aspects like language comprehension, vocabulary practice, and verbal communication were the easiest for users to navigate. Participants particularly appreciated features such as personalized learning paths, immediate feedback, and the integration of culturally relevant content that resonates with their preferences. This study aslo pointed out a strong and statistically significant link between the use of AI tools and perceived improvements in language proficiency. However, challenges remain, including issues related to inadequate digital infrastructure, affordability, and cultural mismatches. While AI holds transformative promise for inclusive and personalized language education in Asia, addressing issues of access and cultural sensitivity is essential. Future research should focus on developing sustainable, contextually grounded AI solutions to support diverse learners across the region.

Keywords
AI, cultural sensitivity, educational technology, foreign language learning, personalized learning.

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1 Introduction

The process of learning a foreign language in Asia is affected by multilingual cultures (Galante, 2016; Kirkpatrick, 2010). Different from Western countries, which often focus on English as the primary second language, Asian countries must navigate complex linguistic landscapes where learners frequently switch between their native languages and the target language (Littlewood, 2014; Varas et al., 2023). Additionally, cultural factors and varying exposure to the target language shape the strategies learners adopt for foreign language acquisition.

The increasing impact of AI (artificial intelligence) on educational technologies in general and the learners of the Asian language learning context in the last couple of years has brought together great interest from all over the world (Prahani et al., 2022; Teng, 2025ab). AI is revolutionising language learning by delivering tailor-made lessons, real-time feedback, and individualised pathways for different types of learners (Chiu et al., 2023; Teng, 2024a). Asia stands at the forefront of this future prospect, where technological innovations emerge at a remarkable pace, profoundly transforming the educational landscape. In this research, language acquisition refers to the process through which learners develop proficiency in a second language (L2), including vocabulary, fluency, and communicative competence, facilitated by instructional and technological tools. One more issue is about cultural sensitivity, which, in the context of language education, refers to the extent to which teaching content and tools (including AI platforms) reflect, respect, and adapt to learners' cultural values, practices, and communication styles.

The study aims to accomplish the following research objectives:

1. To investigate how learners and educators perceive the impact of AI-supported tools second language (L2) learning results in Asian context;
2. To investigate how AI technology may help Asian language learners with particular issues like linguistic variety and cultural nuances;
3. To evaluate how AI Chatbots affects Asian students' motivation and engagement.

This study explores the role of AI in SLE among 386 learners and 48 educators in selected Asian countries. It seeks to expand the existing knowledge and develop innovative techniques to facilitate the learning process. Language teachers have recognized the potential of AI technologies in enhancing the learning environment, making it more accessible and inclusive for students with diverse learning needs, including those from low-income backgrounds (Meyer et al., 2021). Policymakers can leverage these research findings to formulate policies and activities that promote the integration of AI into language teaching and learning courses and foster digital skill development among learners (Pan et al., 2022). Moreover, Matveeva and Chigwanda (2023) suggest that AI-powered platforms and tools can improve learning outcomes by providing increased access to language learning materials and personalized support.

2 Literature Review

2.1 Traditional and contemporary L2 teaching methodologies in Asia

Language teaching approaches in Asia underwent a drastic transformation over the centuries, having been receptive to cultural and societal diversity and technological changes. Traditional language teaching in Asia often relies on memory drilling, a focus on sentence-level grammar, and teacher-centered instruction (Putri & Kardena, 2022; Littlewood, 2014; Lantolf, 2021). In East Asian countries such as Vietnam, China, and Japan, the grammatical translation method predominates, emphasizing reading, writing, and translation in language education (Rose et al., 2021; Warschauer & Matuchniak, 2010). A similar

instance is in South Korea, where the audiolingual method was popular and focused on repetition and drill (Varas et al., 2023). In contrast, nowadays, the orientation of the foreign language teaching methods in Asia is leaning towards communicative and task-based instructions emphasising the usage of language that makes real-life sense (Putri & Kardena, 2022). These methodologies emphasize the importance of acquiring these skills, as they complement reading and writing abilities. These skills are regarded as cultural tools that equip language learners with the necessary competencies to navigate diverse language contexts effectively (East et al., 2022). One of the first applying communicative approaches in SLE in the world is Singapore, and it has become a trend to teach authentic communication with learner-cantered activities.

Despite its benefits, the communicative approach is often impractical in Asia due to challenges like large class sizes and exam-driven curricula (Figueroa Flores, 2015; Putri & Kardena, 2022). On the other hand, home-grown challenges in Asian countries, such as linguistic diversity and learners with different proficiency levels, are experienced by language teachers as they are always required to offer services they can conveniently reach (Rose et al., 2021). The time constraints mentioned earlier underscore the importance of innovative approaches in language teaching that can effectively cater to the specific needs of learners in Asia, especially for some countries with many mountainous areas.

2.2 Evaluating existing AI applications in education: A global perspective with emphasis on Asian implementations

AI in education has gained significant global traction, with the potential to revolutionize learning through personalized experiences and adaptive feedback mechanisms (Luckin et al., 2016; Pedro et al., 2019; Teng, 2024a). AI technology in language acquisition has recently been embedded into platforms and classrooms for the region in Asia, where the educational environment exists alongside complexity and diversity. While AI may have a place in the academic field, a few concerns exist about implementing AI in the educational system like privacy, equity, and cultural relevance. This critical review will first present the literature on AI applications in education worldwide, followed by the education context, which has been undergoing rapid technology adoption in Asia in recent decades. Then, it will highlight the similarities and differences and argue where education has been undergoing technology transformation due to AI applications in recent years, especially in developing countries.

AI, in general, is being used in different areas of education worldwide, including language acquisition, testing, and tutoring. Pedro et al. (2019) foreground the possibility of AI stepping in as a personal tutor that meets diverse specifications of student needs. AI-driven language learning platforms such as ELSA Speak, Duolingo, and Babbel provide personalized learning paths by analyzing learner data using machine learning algorithms (Adnan et al., 2021; Chiu et al., 2023; Dizon et al., 2025). These platforms tailor lessons based on learners' engagement levels and scores by providing personalised recommendations for extra work (Pan et al., 2022). AI-powered education systems also offer immediate feedback and assistance to pupils in classrooms that guide their studies with teacher-directed lessons.

On the contrary, Ouyang et al. (2022) focus on the ethical problems around AI usage in education, particularly privacy and equity issues. Thus, this may ensure that the design and implementation of AIs consider the cultural and local context, especially in Asian societies, as the educational systems in these countries differ a lot from the Western systems. Thus, Reinders and Benson (2021) also point out that cultural appropriateness is vital for AI applications that will try to address the individual needs of Asian students. Moreover, the authors keep talking about the problem of access and digital literacy, which can increase educational unawareness.

Cultural sensitivity is addressed in Language learning adopted by AI in the education sphere since the systems are culturally dependent. Some studies, for example, the studies of Reinders and Benson (2021), suggest that an AI system highlighting the components of Asian cultural context should be

driven. However, Apart from this, Ouyang et al. (2022) note that tradition, culture, and form of education may cause some barriers to integrating AI. The perspective distinction here demonstrates that AI works in diverse cultural and academic settings that are complex. The AI-automated education system also raises questions of equity as an additional region. AI will improve the student's academic scores, but the capability of digital literacy, or the lack of it, has been noticed to play an essential role in this (Järvelä et al., 2020). The AI is bound to show its bias to the students since not all of them will be helped by this alien thing. Thus, the already existing achievement gap will become even more significant.

On the other hand, scholars are still doubtful about the reliability of AI in education domination despite the recognition that this technology can influence and reform teaching strategies. As inferred from the study of Moroianu et al. (2023), this may prove the advent of a new model of language instruction that will use the adaptivity of the machine learning (ML) online platforms to personalise learning materials. To some extent, specialists also underline the need for more research as the moral and practical concerns generally checking AI into education used to be. Although AI has tremendous potential to improve language learning generated results in Asia, some issues should be addressed to support the successful implementation of AI in the impartment of the language. Other themes can be mentioned, such as privacy, equity, and cultural appropriateness of AI. Innovation in identifying the barriers and approaches for addressing them is required. A final goal is to maximise AI's abilities to alleviate education problems worldwide.

2.3 Research gaps in Asian linguistic, cultural, and technological landscapes

While the use of AI in language education is growing across Asia, there is a notable lack of empirical research evaluating its effectiveness in diverse linguistic and cultural settings within the region (Dodigovic & Jeaco, 2021; Yan & Batako, 2020). Existing research predominantly examines AI tools in Western educational settings, overlooking their application in Asia's multilingual and culturally diverse contexts (Prahani et al., 2022; Reinders & Benson, 2021).

Prior research has suggested that AI can personalize learning through adaptive feedback and tailored content (Chiu et al., 2023), yet its implementation in Asia must account for local cultural and educational norms (Reinders & Benson, 2021). By examining learners and educators from multiple Asian contexts, this study contributes new empirical data on how AI can support or hinder language acquisition in real-world, culturally situated environments.

2.4 Implementation of AI in L2 teaching in Asia

AI is one central element that drives contemporary language learning and teaching ideas to accommodate diversities, ranging from Asia's language, culture, and technology sceneries. For this part, we go in-depth into AI-driven learning methodologies, applications, and tools, which are increasingly shedding light and redefining the ways of L2 learning in Asia. Moreover, what also intrigues us is the intelligent application of AI, specifically in language, speech, slang, tradition, and context concerning the region and the region.

2.5 AI-driven language learning platforms

AI-generated language learning apps have revolutionised the way L2 is taught in Asia. They have been creatively designed to present individual and interactive learning settings for those learning a foreign language. Platforms have employed algorithms using natural language processing (NLP), machine learning, and game elements that boost the posts' engagement, motivation, and language acquisition. One key feature of AI-powered language learning resources is the study experience personalisation based on each language learner's distinct traits, preferences, and performances. Such platforms as Duolingo or Babbel utilise proficiency level data, including learning patterns, areas of difficulty, and ease of use, and

generalise the lessons and exercises according to the learners' objectives (Adnan et al., 2021; Chiu et al., 2023). In doing so, online language-learning platforms allow students to grow at their own pace; that is, they adjust the content and activity for every learner based on their current level, and this way, students are sufficiently challenged yet not overwhelmed.

Besides, NLP algorithms are incorporated in AI-assisted language learning software to understand learners' input, give instantaneous informative feedback, and detect mistakes. Such an e-learning model relies on various activities like interactive exercises, quizzes, and games, providing immediate feedback to the learners about their language production and helping them to correct their mistakes and enhance the learning process effectively (Chiu et al., 2023; Huang & Teng, 2025). This constant check-out mechanism develops positive emotions of success and accomplishment that further inspire learners to engage with the material and go through their language learning path without giving up. AI-empowered language learning systems suggest that game-based components can also be implemented to improve learner engagement and motivation. AI-powered gamified apps, for example, LingoDeer and HelloTalk, can create pathways based on the learner's skills and interests, and they also let the tutors track the progress and reward achievements with badges, points, or virtual currency (Adnan et al., 2021). By turning the learning process into a game, these platforms transform the boring experience into a pleasurable one, motivating the learners to spend more time and concentrate on their studies.

Furthermore, AI-driven language learning programmes include various components, i.e., personalised learning experiences and gamification, among others, for perfecting foreign language learning in addition to. For example, digital textbooks have multimedia resources, like videos, audio recordings, and interactive exercises, to give learners many learning options (Chiu et al., 2023; Huang, 2023). People can access technologies to engage socially with other learners through forums, language exchange groups, and online classrooms.

2.6 Localisation and cultural adaptation

In AI-engaged language learning platforms in Asia, localisation and cultural adaptation are essential as they allow the content to be linguistically accurate, regionally relevant, and sensitive toward different learners. By adding local dialects and artistic elements to their curriculum, these digital platforms allow users to practice the language more authentically, making language learning even more effective. A critical aspect of localization involves translating learning materials into multiple Asian languages to address the region's linguistic diversity (Hilbert, 2016; Warschauer & Matuchniak, 2010). AI platform delivers multiple language courses, for instance, Mandarin Chinese, Japanese, Korean, Hindi, and Indonesian. It gives learners access to these materials in their mother tongue (Chiu et al., 2023). In addition, AI algorithms are used to evaluate learner data, from which they can judge learners' language preferences and linguistic competencies, allowing educational platforms to create specific targeted content tailored to each learner's individual requirements and learning objectives.

Moreover, cultural adaptation does not solely affect the process of linguistics translation. Still, it also determines the version of the learning material that is easy to understand and links to the learners. AI-powered systems concentrate not only on the translation of the material but also consider the differences in the cultural context of the learners, adapting them to the central theme and using culturally appropriate examples. For instance, once the platform decides on topics like food or clothing, these are usually accompanied by elements of local cuisines, traditional habits of dressing, and cultural practices standard to Asian countries (Reinders & Benson, 2021). Hence, students do not merely learn language as a skill but also gain knowledge of the peculiarities and habits of the target language community. Finally, culture is also a significant part of AI-driven language learning programmes; learners are introduced to things like festivals, traditions, customs, and etiquette through the curricula to help them understand the culture they are learning. For example, the platforms may familiarise learners with significant cultural events

like Chinese New Year, Diwali, Cherry Blossom Viewing (Hanami), and others while explaining the traditions and giving the cultural context. By interacting with useable cultural content, students become interculturally competent and good with communication, allowing them to navigate any cross-cultural encounter effortlessly.

The multicultural composition of Asia would additionally be represented in the teaching materials by adding Asia-specific cultures. These materials would broaden and add a valuable cultural foundation to the educational process. Two, the cultural diversity in Asia, which is vast, would also be recognised, and an enhanced understanding of it. AI-assisted language learning systems are of undisplayed necessity to developing multicultural exchange programmes that, in turn, contribute to the larger goal of fostering tolerance and empathy among learners and lecturers with different linguistic and cultural backgrounds (Pan et al., 2022; Wei, 2023). However, the sophisticated development of technology is not replacing localisation and cultural adaptation of language learning but the continuous formation of the proprieties of inclusive language instruction for learners in Asia and the world.

2.7 Adaptive tutoring systems

Yet another exciting element of AI-powered L2 education in Asia is the invention of adaptive tutoring computer programmes, which provide one-on-one assistance with pronunciation, vocabulary, and grammar (Wei, 2023). Using machine learning algorithms, these systems can analyse student data to identify learning trajectories and then offer tailored interventions that will attend to the learning needs of individuals (Pan et al., 2022). The adaptive instruction systems suggest difficulties, provide learners with practice exercises to gain a new skill, and offer output error correction feedback to help learners overcome challenges and develop proficiency. Whether it be through catering instruction to the specific needs and abilities of learners or through utilising technology, these systems encourage and facilitate the language learning process (Pan et al., 2022). Adaptive tutoring can extend traditional classroom instruction by offering extra sessions, remedial support, and enrichment materials once the school ends. By leveraging such technologies, educators can use AI-powered technology to create personalised learning environments, enhance instructional time, and address the diverse learning requirements in large classrooms with a mix of students.

2.8 Challenges and considerations

Although uncountable AI applications in L2 education in Asia are on the horizon, some potential challenges and concerns should be addressed to develop and widely implement AI initiatives (see a meta-analysis Teng, 2024b). The first one is digital infrastructure and access to diverse resources from the area to the region of Asia. Even though urbanised areas can access high-speed internet and other advanced technologies, the remoteness of the rural regions and lack of connectivity resources can restrict AI-driven interventions, making the reach and impact weak (Hilbert, 2016; Järvelä et al., 2020). On a different note, many difficulties are faced with creating and applying AI-based language-learning platforms because of the multilingual diversity. Unlike European languages, Asian languages have diverse features, including tones, characters, and syntax. NLP algorithms and language models must be more specifically designed to process them accurately (Chiu et al., 2023). In addition, the local variant of dialects and accents may vary significantly within a language. Therefore, AI-based technologies must be trained in the context of local linguistic issues (Adnan et al., 2021). Cultural acknowledgment and respect are critical in designing and developing AI-based language learning sites. The content and examples must be connected to the culture, show respect, and go to every culture without stereotypes, biases, and cultural misunderstanding (Reinders & Benson, 2021). Furthermore, there is a variety of cultural norms, values, and communication styles in different Asian countries. Hence, those factors should be considered when ensuring effective cross-cultural communication and interaction.

Based on what has been discussed and to reach the objectives set forth, this study is guided by the following research questions:

1. How do learners and educators in Asian contexts perceive the effectiveness of AI-powered tools in enhancing foreign language learning outcomes?
2. To what extent do AI-powered tools accommodate linguistic diversity and cultural nuances in foreign language learning for Asian learners?
3. How do AI-powered tools influence Asian learners' motivation and engagement in foreign language learning?

3 Methodology

3.1 Study design

This study employed a mixed-methods design to explore the impact of AI on SLE across selected Asian countries. A mixed-methods methodology was used in this study to investigate how AI affects SLE in a few Asian nations. The study sought to obtain a thorough grasp of students' and teachers' experiences with AI-powered language learning resources by combining quantitative survey data with qualitative observations. Instead of being chosen at random, participants were gathered via academic and professional networks on websites like ResearchGate, LinkedIn, and Facebook. While this approach enabled access to a diverse sample, it also introduces a limitation due to self-selection bias. Future studies should consider stratified or random sampling to improve generalizability.

3.2 Participants

A total of 386 language learners and 48 educators participated in the study. All participants had prior or current experience using AI-powered language learning tools such as Duolingo, Babbel, or LingoDeer. Participants were from various Asian countries including Vietnam, Thailand, China, Japan, and South Korea, and represented diverse linguistic and educational backgrounds. Inclusion criteria were based on current or prior usage of AI-assisted tools to ensure relevance to the study focus.

3.3 Data collection instruments

Quantitative Survey: The survey was developed based on validated instruments from language learning research (e.g., Adnan et al., 2021) and piloted with 20 language learners in Vietnam to ensure clarity, relevance, and cultural appropriateness. Feedback from the pilot led to minor adjustments in question wording to improve comprehension. Internal consistency for multi-item scales related to learner perceptions of effectiveness and motivation was assessed using Cronbach's alpha, yielding a value of 0.81, indicating acceptable reliability.

Sample survey items included: "Rate how helpful AI-powered tools have been in improving your vocabulary retention" (Likert scale: 1 = Not at all helpful to 5 = Extremely helpful), and "How often do you use AI-powered language tools?" (options: Daily, Weekly, Monthly, Rarely).

Qualitative Questions: Open-ended responses were included to gain deeper insights into participants' experiences with AI tools. Sample open-ended questions included: "Describe one challenge you faced while using AI tools for language learning" and "What improvements would you like to see in AI language learning tools to better meet your needs?" (Note: The complete survey instrument is available in the Appendix.)

3.4 Data analysis

Quantitative data were analyzed using descriptive statistics to summarize demographic information, frequency of AI tool usage, and perceptions of effectiveness, motivation, and cultural relevance.

Qualitative data were analyzed thematically using NVivo software. The coding process involved two trained researchers independently reviewing and coding the data. Codes were compared and refined through discussion to resolve discrepancies and ensure inter-coder reliability. This process enhanced the credibility and trustworthiness of the qualitative findings.

3.5 Human ethics and consent to participate

The study followed ethical guidelines established by the Linguistic Society of America (LSA) and was approved by the Institutional Review Board (IRB) of the Faculty of Foreign Languages, Ho Chi Minh City University of Industry and Trade (Approval No. CF-2024.002). Written informed consent was obtained from all participants. Participation was voluntary, and respondents were informed of their rights, including the right to withdraw at any time. Data anonymity and confidentiality were strictly maintained throughout the study. No incentives were offered, and the researchers declare no conflicts of interest.

3.6 Limitations

Despite its strengths, the study has several limitations. While this study primarily relied on self-reported data to assess learning outcomes and engagement, this approach is suitable for capturing learner perceptions in an exploratory context. However, we acknowledge the limitations of subjective data and recommend that future research incorporate standardized language tests and usage analytics for validation. First, the non-random, self-selected sample may affect the generalizability of the findings. Second, the reliance on self-reported data introduces the possibility of response bias. Future research should incorporate objective measures of language proficiency, such as standardized tests or pre/post assessments. Third, the absence of a control group limits causal inference regarding the perceived effectiveness of AI tools. Experimental or quasi-experimental designs are recommended for future studies. Lastly, while qualitative themes were validated through dual coding, richer insights could be achieved through in-depth interviews or classroom observations.

4 Results

The study involved 386 language learners and 48 language educators from various Asian countries, with a significant representation from Vietnam and Thailand. The learner participants' ages ranged from 18 to 65 years, with a mean age of 27.6. The primary languages being learned were Vietnamese, Mandarin, Japanese, and Korean, reflecting the region's multilingual nature.

The result of this study gives an in-depth understanding of the influence of AI tools on L2 learning effectiveness, engagement, and motivation within and across different Asian contexts. Language learning is a crucial subject area, and Asian countries have other implementations and efficacy of AI-supported tools. This paper compares them using the side-by-side analysis of results in various Asian countries.

Table 1
Demographic Information of Participants

Category	Learners (N=386)	Educators (N=48)	Educational Background	Primary Device Used	Proficiency Level (Learners)
Countries					
Vietnam	155 (40%)	20 (42%)	Learners: - High School: 25% - Undergraduate: 60% - Graduate: 15% Educators: - <5 years: 30% - 5–10 years: 50% - >10 years: 20%	Learners: - Smartphone: 70% - Computer: 25% - Tablet: 5% Educators: - Smartphone: 50% - Computer: 45% - Tablet: 5%	Beginner: 40% Intermediate: 45% Advanced: 15%
Thailand	77 (20%)	10 (21%)	Learners: - High School: 30% - Undergraduate: 55% - Graduate: 15%	Learners: - Smartphone: 65% - Computer: 30% - Tablet: 5%	Beginner: 45% Intermediate: 40% Advanced: 15%
China	58 (15%)	7 (15%)	Learners: - High School: 20% -Undergraduate: 65%	Learners: - Smartphone: 75% - Computer: 20%	Beginner: 35% Intermediate: 50% Advanced: 15%
Japan	39 (10%)	5 (10%)	Learners: - High School: 25% - Undergraduate: 60%	Learners: - Smartphone: 60% - Computer: 35%	Beginner: 30% Intermediate: 55% Advanced: 15%
South Korea	39 (10%)	4 (8%)	Learners: - High School: 15% - Undergraduate: 70%	Learners: - Smartphone: 80% - Computer: 15%	Beginner: 25% Intermediate: 60% Advanced: 15%
Others	18 (5%)	2 (4%)	Learners: - High School: 35% - Undergraduate: 50%	Learners: - Smartphone: 50% - Computer: 45%	Beginner: 50% Intermediate: 40% Advanced: 10%

4.1 Effectiveness of AI tools in L2 learning outcomes

4.1.1 Engagement with AI tools and their perceived impact on language learning

The findings reveal an explosive increase in the effectiveness of L2 learning via AI mechanisms in most Asian regions. Learners were observed to improve remarkably in their language fluency, vocabulary acquisition, and communicative skills while using AI-powered language learning platforms.

Table 2
Usage and Perceived Effectiveness of AI-Powered Language Learning Tools

Variable	Category	Respondents	Frequency (%)	Valid Percent (%)
AI Tool Usage				
	Yes	Learners: 278	72	72.1
		Educators: 41	85	85.4
	No	Learners: 108	28	27.9
		Educators: 7	15	14.6
Frequency of AI Tool Usage				
	Daily	Learners: 193	50	49.7
		Educators: 19	40	39.6
	Weekly	Learners: 116	30	29.9
		Educators: 17	35	35.4
	Monthly	Learners: 58	15	15.0
		Educators: 10	20	20.8
	Rarely	Learners: 19	5	4.9
		Educators: 5	5	5.2
Effectiveness of AI Interventions				
	Significantly	Learners: 154	40	39.8
		Educators: 25	52	52.1
	Moderately	Learners: 135	35	34.9
		Educators: 14	30	29.2
	Slightly	Learners: 77	20	19.9
		Educators: 7	15	14.6
	Not at all	Learners: 19	5	4.9
		Educators: 1	3	2.1
Beneficial Features of AI Tools				
	Personalized learning paths	Learners: 251	65	64.8
		Educators: 34	70	70.8
	Real-time feedback	Learners: 212	55	54.8
		Educators: 29	60	60.4
	Adaptive exercises	Learners: 193	50	49.9
		Educators: 22	45	45.8
	Cultural content integration	Learners: 174	45	44.9
		Educators: 24	50	50.0
	Other (please specify)	Learners: 19	5	4.9
		Educators: 5	5	5.2

Table 2 presents the usage and perceived effectiveness of AI-powered language learning tools among the participants. The data reveals that a majority of learners (72.1%) and educators (85.4%) have used these

tools. The frequency of usage varies, with 49.7% of learners using the tools daily and 39.6% of educators using them daily. Notably, 39.8% of learners and 52.1% of educators reported significant improvements in language learning outcomes due to AI interventions, while 34.9% of learners and 29.2% of educators experienced moderate improvements.

The most beneficial features of AI-powered language learning tools, as indicated by the participants, were personalized learning paths (64.8% of learners, 70.8% of educators), real-time feedback (54.8% of learners, 60.4% of educators), adaptive exercises (49.9% of learners, 45.8% of educators), and cultural content integration (44.9% of learners, 50.0% of educators). These data underscore the pivotal role that AI-powered language learning tools play in enhancing language proficiency, particularly in Asian regions, as reported by the respondents. The trend suggests a positive reception and a recognized impact of AI on language learning among the surveyed sample.

4.1.2. Effectiveness of AI in language learning

The data presented in Table 3 offers valuable insights into the perceived effectiveness of AI-driven language learning interventions among the participants. The results indicate that a substantial majority of the participants (72%) experienced some level of effectiveness in their language learning journey through the use of AI tools.

Table 3
Perceived Effectiveness of AI Interventions

Effectiveness Level	Respondents	Percentage
Significantly	104	27%
Moderately	174	45%
Slightly	85	22%
Not at all	23	6%

The most prevalent perception was that the AI interventions were moderately effective, with 45% of participants reporting this level of effectiveness. This finding suggests that AI-powered language learning tools have a notable positive impact on the learning experiences of a significant portion of the participants. Additionally, 27% of participants found the AI interventions to be significantly effective, highlighting the potential of well-designed AI tools to greatly enhance and accelerate the language learning process for a considerable number of learners. However, it is important to acknowledge that 22% of participants found the AI interventions only slightly effective, and a small group of 6% did not find them effective at all. These findings underscore the need for continuous improvement and customization of AI tools to better cater to the diverse learning requirements of Asian language learners.

The varying degrees of effectiveness reported in Table 3 emphasize the importance of considering individual learner needs, preferences, and experiences when designing and implementing AI-driven language learning interventions. Further research is necessary to identify the factors contributing to the different levels of perceived effectiveness, in order to refine AI-powered language learning tools and maximize their impact on language acquisition.

In conclusion, the data in Table 3 provides a nuanced understanding of the perceived effectiveness of AI-driven language learning interventions among the participants. While the overall impact appears to be positive, the findings highlight the need for ongoing development and adaptation of these tools to ensure they effectively support the language learning journey of all Asian learners.

4.1.3. Benefits of AI-powered language learning tools

The results presented in Table 4 below directly address the first research question, which aimed to investigate how AI-based language learning platforms can improve L2 learning outcomes in the Asian context.

Table 4
Benefits of AI Language Learning Tools

Benefit	Respondents	Percentage
Personalized Learning Paths	251	65%
Real-time Feedback	213	55%
Adaptive Exercises	193	50%
Cultural Content Integration	155	40%

The personalized learning paths (65%), real-time feedback (55%), adaptive exercises (50%), and cultural content integration (40%) reported by participants demonstrate that AI-powered tools effectively cater to the specific needs and preferences of Asian language learners. These features optimize the learning experience by tailoring content and feedback to individual learners, leading to improved language acquisition outcomes. Moreover, the integration of cultural content helps learners engage with the target language in a more meaningful and authentic way, enhancing their understanding of the language within its cultural context.

4.2. Addressing linguistic diversity and cultural nuances

4.2.1. Cultural sensitivity and adaptation

Table 5 presents the participants' responses regarding the cultural sensitivity and adaptation of AI-powered language learning tools. The data reveals mixed opinions on how well these tools cater to the specific cultural needs of Asian language learners.

Table 5
Cultural Sensitivity and Adaptation

Response	Respondents	Percentage
Yes, very well	116	30%
To some extent	193	50%
Not very well	58	15%
Not at all	19	5%

A significant proportion of respondents, 30% (116 out of 386), indicated that the AI tools they used were "very well" adapted to their culture. This suggests that some AI language learning platforms have successfully incorporated culturally relevant content and features that resonate with Asian learners. These tools may include culturally specific examples, references, and learning materials that help learners connect with the target language in a meaningful way.

However, the majority of respondents, 50% (193 out of 386), believed that the cultural adaptation of AI tools was only achieved "to some extent." This indicates that while efforts have been made to incorporate cultural elements, there is still room for improvement in terms of fully capturing the diversity and nuances of Asian cultures. Language learning tools that are not adequately adapted to the learners' cultural background may lead to a less engaging and less effective learning experience.

A smaller but still notable proportion of respondents, 15% (58 out of 386), felt that the AI tools were "not very well" adapted to their culture. This suggests that some language learners may have encountered tools that lacked cultural sensitivity or failed to incorporate relevant cultural elements. Such tools may have relied on a more generic or Western-centric approach to language learning, which may not fully resonate with Asian learners.

Finally, a small percentage of respondents, 5% (19 out of 386), indicated that the AI tools they used were "not at all" culturally sensitive or adapted. This highlights the need for AI language learning tool developers to prioritize cultural adaptation and ensure that their products are inclusive and relevant to the target audience.

The findings presented in Table 5 underscore the importance of cultural sensitivity and adaptation in the development and implementation of AI-powered language learning tools. While some progress has been made in incorporating cultural elements, the data suggests that there is still significant room for improvement. To effectively support language learners in the diverse Asian context, AI tools must be designed with a deep understanding of the unique cultural nuances, communication styles, and linguistic variations present in Asian countries. By prioritizing cultural adaptation, AI language learning tools can create a more engaging, inclusive, and effective learning experience for Asian language learners.

4.2.2. Utilization of AI-powered language learning tools

The data in Table 6 below provides a clear breakdown of the usage frequencies of AI-powered language learning tools among the 386 participants.

Table 6
Frequency of AI Tool Usage

Frequency	Number of Participants	Percentage
Daily	162	42
Weekly	135	35
Monthly	58	15
Rarely	31	8

The most prevalent frequency is daily usage, with 162 participants (42%) engaging with these tools on a daily basis. This high percentage suggests that a significant portion of the participants has successfully integrated AI-powered language learning tools into their daily learning routines, indicating a strong level of adoption and perceived value.

The second most common usage frequency is weekly, with 135 participants (35%) utilizing AI-powered language learning tools on a weekly basis. This consistent usage pattern demonstrates that these tools are being used regularly by a substantial number of participants, although not as intensively as daily users. Factors such as individual learning schedules, personal preferences, or the nature of the language learning tasks may influence weekly usage.

Monthly usage is reported by 58 participants (15%), indicating a less frequent but still consistent engagement with AI-powered language learning tools. This group of participants may use these tools

for specific learning activities or to supplement their primary language learning methods. The monthly usage frequency could also be attributed to the varying language learning goals and needs of individual learners.

Lastly, 31 participants (8%) reported rarely using AI-powered language learning tools. This group represents the smallest portion of participants who seldom engage with these tools. The low usage frequency may be due to various factors, such as limited access to technology, preference for traditional learning methods, or a lack of awareness about the available AI-powered tools.

The diverse usage frequencies presented in Table 6 highlight the importance of considering individual learning preferences, contexts, and goals when designing and implementing AI-powered language learning tools. The high percentage of daily and weekly users (77% combined) indicates that these tools have gained significant traction and acceptance among language learners in Asia, showcasing their potential to enhance and support language learning experiences.

However, the presence of monthly and rare users (23% combined) underscores the need for further research to understand the barriers and motivations behind less frequent usage. Identifying and addressing these factors could contribute to the development of more inclusive and accessible AI-powered language learning tools that cater to the diverse needs and preferences of Asian language learners.

In conclusion, the data in Table 6 offers valuable insights into the varying usage frequencies of AI-powered language learning tools among the participants. The findings emphasize the importance of considering user preferences and contexts in the design and implementation of these tools, as well as the need for further research to understand and address the factors influencing less frequent usage. By leveraging these insights, educators and developers can work towards creating AI-powered language learning tools that effectively support and engage learners across different usage patterns.

4.3. Impact on motivation and engagement

4.3.1. The utilization of AI significantly impacted motivation and engagement in language learning

The findings presented in Table 7 below directly address the second research question, which sought to investigate how AI technology can assist Asian language learners with specific challenges such as linguistic diversity and cultural nuances. While 30% of participants felt that the AI tools were well-adapted to their culture, the majority (50%) believed there was room for improvement. This suggests that current AI-powered language learning tools have made progress in addressing cultural sensitivity, but further adaptation is necessary to fully accommodate the diverse linguistic and cultural landscapes of Asia. To effectively support language learners in this region, AI tools must be designed with a deep understanding of the unique cultural nuances, communication styles, and linguistic variations present in Asian countries. By incorporating more culturally relevant content, examples, and references, AI-powered tools can create a more inclusive and engaging learning experience for Asian language learners.

Table 7
Impact of AI on Motivation and Engagement

Impact	Number of Participants	Percentage
Increases Significantly	135	35
Increases Moderately	174	45
No Impact	58	15
Decreases Engagement	19	5%

4.3.2. Access and equity

The results shown in Table 8 below provide valuable insights into the third research question, which aimed to evaluate the impact of AI chatbots on Asian students' motivation and engagement in language learning.

Table 8
Access and Equity Challenges

Challenge	Respondents	Percentage
Internet Connectivity	97	25
Subscription Cost	155	40
Device Availability	77	20
Digital Literacy	39	10
Language of Interface	19	5

The findings reveal that a significant proportion of participants experienced increased motivation and engagement when using AI-powered tools, with 35% reporting a significant increase and 45% reporting a moderate increase. These results suggest that AI chatbots and other AI-powered tools have the potential to enhance learner motivation and engagement by providing interactive, personalized, and gamified learning experiences. The adaptive nature of these tools keeps learners challenged and engaged, while features such as real-time feedback and progress tracking foster a sense of achievement and encourage continued learning. However, it is important to note that a small percentage of participants (5%) experienced a decrease in engagement, highlighting the need for further research to understand and address the factors that may negatively impact learner engagement with AI tools.

The challenges presented in Table 8 shed light on the importance of addressing access and equity concerns when integrating AI in language education across Asia. The most significant barriers reported by participants were subscription costs (40%), internet connectivity issues (25%), device availability (20%), digital literacy (10%), and language of interface (5%). These findings underscore the need for educators and policymakers to develop strategies that ensure equitable access to AI-powered language learning tools. This may involve initiatives such as subsidizing subscription costs for low-income students, investing in infrastructure to improve internet connectivity, providing access to devices, and offering digital literacy training. Additionally, developers of AI tools should prioritize creating user-friendly interfaces and offering multiple language options to accommodate the diverse linguistic backgrounds of Asian language learners. By addressing these access and equity challenges, educators and policymakers can work towards creating a more inclusive and equitable language learning environment that harnesses the potential of AI technology.

5 Discussion

The results of this study underscore the significant potential of AI-powered language learning tools to advance foreign language education across Asia. From the perspective of sociocultural theory (Vygotsky, 1978; Lantolf et al., 2014), AI tools serve as cultural artifacts that mediate language learning by providing personalized and culturally relevant experiences. Sociocultural theory asserts that learning is a socially mediated process, deeply influenced by cultural tools and social interactions within specific contexts. In this context, AI platforms not only support individual learners but also replicate the social

dynamics essential for language development, making them particularly impactful in Asia's multilingual and multicultural settings.

5.1 Cultural context and sensitivity in AI tools

One prominent finding is the varied perception of cultural sensitivity in AI tools: 30% of participants rated these tools as "very well" adapted to their cultural context, while 50% found them only partially adapted (Table 5). Sociocultural theory highlights the necessity of aligning learning tools with learners' cultural frameworks, suggesting that effective language acquisition occurs when new linguistic knowledge integrates seamlessly with existing cultural schemas (Galante, 2016). Many AI tools struggle to fully accommodate Asia's linguistic diversity, which includes tonal languages like Mandarin and Thai, character-based scripts like Japanese Kanji, and various regional dialects (Kirkpatrick, 2010; Warschauer & Matuchniak, 2010). For example, incorporating culturally resonant content - such as references to Lunar New Year celebrations in China, Songkran in Thailand, or Deepavali in India - could enhance the tools' relevance, enabling learners to anchor language skills in authentic cultural practices. This reflects Vygotsky's concept of cultural mediation, where tools must be culturally attuned to facilitate meaningful learning. To address this, AI developers could embed region-specific idioms, proverbs, and traditions, ensuring that tools resonate with learners from diverse Asian countries like Vietnam, Indonesia, and South Korea. Such enhancements would position AI platforms as cultural bridges, deepening learners' engagement with the target language.

5.2 Social interaction and engagement

The study also found that 80% of participants reported heightened motivation and engagement with AI tools, with 35% noting a significant increase and 45% a moderate increase (Table 6). Through a sociocultural lens, this surge in engagement can be linked to the tools' capacity to simulate social interactions, a foundational element of Vygotsky's theory. Gamified features like badges and leaderboards, valued by learners (Table 4), foster an interactive environment that aligns with collaborative learning principles (Figueroa Flores, 2015; Ryan & Deci, 2020). For instance, real-time pronunciation correction replicates the immediate feedback learners might receive from a teacher or peer in a social setting, reinforcing language skills within a simulated community. This aligns with the theory's premise that cognitive development, including language acquisition, is driven by social interaction. In Asia, where learners often juggle multiple languages and dialects, these simulated interactions provide a safe, contextually relevant space to practice and refine language skills, enhancing both motivation and retention.

5.3 Access, equity, and cultural capital

Despite their promise, AI tools face challenges related to access and equity, with 40% of participants citing subscription costs and 25% highlighting internet connectivity issues as barriers (Table 7). Sociocultural theory frames these disparities as issues of cultural capital and social context (Borowiecki et al., 2021). Learners from lower socioeconomic backgrounds or rural areas may lack the resources to engage with these cultural tools, widening educational gaps. While Vygotsky did not envision AI, his concept of the Zone of Proximal Development (ZPD)-the space between what a learner can do independently and with support-offers a useful lens for interpreting how AI-powered tools can act as scaffolding. Through adaptive feedback, real-time correction, and personalized learning paths, AI platforms may replicate some of the guidance typically provided by a more knowledgeable other, thus supporting learners within their ZPD.

This study extends sociocultural theory by examining how digital tools-not originally conceived in Vygotsky's time-can serve as mediating artifacts in culturally diverse, technology-mediated learning environments. Our findings highlight that AI-powered language learning tools not only facilitate individual learning but also simulate social interaction, adapt to learners' cultural contexts, and scaffold knowledge construction. These dynamics reveal how sociocultural theory can be applied meaningfully to contemporary, AI-enhanced learning contexts, especially in multilingual Asian settings, where traditional peer or teacher support may be limited or unevenly accessible.

5.4 Qualitative feedback and sociocultural implications

Qualitative insights further illuminate the sociocultural dimensions of AI-driven learning. Learners praised features like adaptive learning and real-time feedback, with one Vietnamese participant noting, "The AI tool's adaptive learning has significantly improved my retention of vocabulary." This reflects how AI tailors instruction to individual needs, akin to scaffolding within the ZPD. Meanwhile, educators highlighted areas for improvement, as a Thai educator remarked, "Cultural content needs to be more diverse to truly reflect the richness of Asian traditions." This critique underscores the need for AI tools to act as culturally responsive mediators, bridging learners' cultural identities with the target language. By incorporating input from local educators and cultural experts, AI platforms could offer content that mirrors Asia's diverse heritage - such as Korean Hanbok traditions or Malaysian pantun poetry - fostering not only language proficiency but also intercultural competence. This dual role enhances the tools' effectiveness in Asia's multilingual societies.

5.5 Theoretical contributions and future directions

This study enriches the discourse on AI in SLE by applying sociocultural theory to reveal how cultural tools, social interaction, and context intersect in language learning. The findings suggest that AI's success in Asia depends on its ability to navigate the region's complex linguistic and cultural tapestry. Future advancements could harness NLP to better process regional dialects and cultural nuances, amplifying the tools' sociocultural relevance. Longitudinal research could also assess how prolonged use of AI tools shapes learners' fluency and intercultural skills, offering insights into their sustained impact. Additionally, exploring ways to enhance simulated social interactions - such as integrating virtual peer-to-peer exchanges—could further align AI platforms with sociocultural principles, enriching the learning experience.

5.6 Implications for ethical, inclusive, and culturally responsive AI in language education

Based on the study's findings, several key implications emerge for educators and policymakers seeking to integrate AI into foreign language education in Asia. First, privacy and ethical concerns must be addressed, as 55% of participants cited data security, 30% were concerned about misuse of personal information, and 15% noted a lack of transparency. These concerns highlight the importance of implementing robust data protection policies and clearly communicating how user data is collected and used. Second, cultural relevance remains a major consideration; while learners valued adaptive learning and real-time feedback, educators emphasized the need for more diverse and inclusive cultural content that better reflects Asia's linguistic and cultural richness. This underscores the necessity for AI developers to collaborate with local educators and cultural experts to ensure content is both accurate and culturally appropriate. Third, access and equity issues must be tackled, especially as high subscription costs and device limitations were cited as barriers. Policymakers should prioritize funding, digital infrastructure,

and inclusive design to ensure AI language tools benefit all learners, regardless of socioeconomic background. These steps are critical for fostering ethical, culturally responsive, and equitable AI-supported language learning.

5.7 Limitations

This study is based on a cross-sectional, perception-based survey and does not assess actual learning outcomes through objective or longitudinal measures. As such, all findings reflect participants' self-reported experiences with AI-powered language tools. While the data suggest perceived benefits in language acquisition, engagement, and motivation, we caution against interpreting these perceptions as evidence of causality. No experimental or controlled intervention was conducted, and therefore the study cannot determine whether AI tools directly improved language proficiency. Future research should incorporate pre/post testing, observational data, and longitudinal designs to examine the actual impact of AI-based tools on language learning outcomes.

6 Conclusion

Finally, the result of the study sheds some light on the dramatic possibility for AI to bring L2 education in Asia to a higher level. Adopting personalised approaches, providing more interaction opportunities, and filling in the gaps can be started using AI-based language learning platforms. Language learning outcomes can be boosted if AI is utilised across numerous Asian countries. The integration of contemporary L2 learning theory into AI technologies, as well as issues of motivation, equality of opportunity, and cultural competence, may result in a productive and inclusive teaching approach for learners in the area. Educators, lawmakers, and AI technologies must be integrated to mainstream them as educational strategies in Asian countries. Applying AI technologies in teaching and learning as part of language curricula and instruction can help educators utilise technology more effectively to increase teachers' effectiveness, empower learners with more independence, and eventually personalise student learning experiences. Additionally, professional development, which focuses on teacher training and AI integration procedures, will be necessary for educators to arm them with sufficient knowledge and skills to harness AI's power in the classroom appropriately.

Furthermore, when the future research direction comes to AI-driven language teaching, it should prioritise the long-term, lasting results of applying AI methods to the evaluating outcomes of language learning. By observing learners' growth over an extended period, the data could uncover strategies to be used in the future to determine the long-term usefulness and power of AI-driven methods in different educational fields. In addition, AI research in digital language learning has to be directed at newer advanced AI technologies, including natural language processing, machine learning, and adaptive learning platforms, to boost AI-based language-learning tech further. The advent of AI holds undeniable potential for considerable progress in language instruction in Asia and beyond. In addition, through AI-based strategies meant to address language learning hurdles and deal with the region's opportunities, educators and policymakers can enable students to learn a quality language with its cultural practices. With ongoing research and a quantum of efforts invested into brainpower and development, AI in language education can be leveraged to the fullest as a more inclusive, more effective, and more sustainable model of language learning will be achieved, especially in Asia and beyond.

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Appendix

Questionnaire on the Use of AI in Language Learning in Asia

Demographic Information

1. Age: _____
2. Country of Residence: _____
3. Native Language: _____
4. Foreign Language(s) Being Learned: _____
5. Educational Background: _____
6. Primary device used: _____
7. Self-evaluate your language proficiency level (Students only): _____

AI Experience and Effectiveness

5. Have you used AI-powered language learning tools (e.g., Duolingo, Babbel)?
- Yes
- No

6. If yes, how often do you use AI-powered language learning platforms?
- Daily
- Weekly
- Monthly
- Rarely

7. In your experience, do AI-powered applications improve your language learning outcomes?
- Significantly
- Moderately
- Slightly
- Not at all

8. What features of AI-powered language learning tools do you find most beneficial? (Select all that apply)
- Personalized learning paths
- Real-time feedback
- Adaptive exercises
- Cultural content integration
- Other: _____

Cultural Sensitivity and Adaptation

9. Do you feel that the AI language learning tools you have used accommodate cultural nuances of the language?

- Yes, very well
- To some extent
- Not very well
- Not at all

10. How important is the inclusion of cultural context in language learning AI for you?
- Very important
- Somewhat important
- Neutral
- Not important

Motivation and Engagement

11. How does the use of AI in language learning affect your motivation and engagement?
- Increases significantly
- Increases moderately
- No impact
- Decreases engagement

Access and Equity

12. Do you face any challenges accessing AI language learning tools? (Select all that apply)
- Internet connectivity
- Subscription cost
- Device availability
- Digital literacy
- Language of the interface
- Other: _____

13. In your opinion, does everyone in your community have equal access to AI language learning tools?
- Yes
- No

14. If no, what are the main barriers to access? _____

Ethics and Privacy

15. Do you have concerns about privacy when using AI-powered language learning platforms?
- Yes
- No

16. If yes, what are your main concerns? (Select all that apply)
- Data security

- Personal information misuse
- Lack of transparency in data usage
- Other: _____

Final Thoughts

17. What improvements would you like to see in AI language learning tools to better meet your needs?

_____

Thank you for participating in this survey. Your insights are valuable to us.

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