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Beyond Fluency: A Systematic Review of AI-Mediated Language Learning and Intercultural Competence in Higher Education

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ABSTRACT

AI-mediated language learning is increasingly used in higher education, yet its contribution to intercultural competence remains insufficiently synthesised. This systematic review examines how AI-mediated technologies and pedagogical designs have been used, which intercultural outcomes have been reported and assessed, and what conditions shape their contribution. Following PRISMA 2020, Scopus, Web of Science Core Collection, and ERIC were searched for peer-reviewed English-language journal articles published from January 2023 to July 2026. From 180 records, 25 primary empirical studies met the eligibility criteria and were examined through narrative thematic synthesis. ChatGPT, large language models, and conversational agents were the dominant technologies, but technology type alone did not determine outcomes. Clearer intercultural development was reported when AI was embedded in culturally contextualised simulations, reflective or metacognitive scaffolding, collaborative exchange, and authentic human interaction. Reported outcomes covered cognitive, affective, and behavioural dimensions, although evidence was more consistent for cultural awareness, perspective recognition, openness, confidence, and willingness to communicate than for sustained pragmatic or behavioural transfer. Assessment approaches varied considerably and frequently relied on self-reported measures. AI offered accessible practice, immediate feedback, and cultural inquiry, but cultural simplification, bias, overreliance, unequal access, and limited interactional repair constrained its value. AI is therefore best understood as an intercultural learning scaffold rather than a cultural authority or substitute for human interaction. Explicit intercultural objectives, critical verification, human mediation, and performance-based assessment are needed to move language learning beyond fluency.

Keywords: AI-mediated language learning; intercultural competence; intercultural communication; higher education; generative artificial intelligence; language education; international education; systematic review

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INTRODUCTION

In an increasingly globalised world, intercultural competence has become essential for students and professionals communicating across linguistic and cultural boundaries. This need is particularly evident in higher education, where international mobility, culturally diverse campuses, transnational programmes, and digital collaboration expose learners to different communicative practices and cultural perspectives. Although language proficiency remains fundamental, fluency alone does not enable learners to interpret culturally situated meanings, examine their assumptions, respond to different perspectives, or negotiate meaning in intercultural encounters. Intercultural competence therefore encompasses not only linguistic knowledge but also openness, cultural and sociolinguistic awareness, interpretive skills, and the ability to communicate appropriately across cultural differences (Byram, 2021; Cong-Lem, 2025; Deardorff, 2006).

The integration of artificial intelligence into language education has created new possibilities for developing these capabilities. In this review, AI-mediated language learning refers to activities in which AI directly mediates language instruction, practice, feedback, interaction, translation, or access to linguistic and cultural content. Relevant technologies include chatbots, conversational agents, large language models, intelligent tutoring systems, adaptive applications, speech-enabled tools, and machine translation systems. These technologies can provide immediate feedback, personalised learning pathways, repeated practice, and access to language input beyond conventional classroom constraints (Alhusaiyan, 2025; Chua & Annamalai, 2025; Du & Daniel, 2024; Zhu & Wang, 2025). They may be particularly valuable for international and multilingual students, although their adoption is also shaped by AI literacy, trust, attitudes, and concerns about inappropriate use (Ittefaq et al., 2025). Their educational value must therefore be considered alongside inclusion, equitable access, and responsible implementation (Duke, 2026).

Emerging empirical research suggests that AI-mediated language learning may support outcomes beyond grammar, vocabulary, pronunciation, and fluency. AI-supported environments have been associated with intercultural communication competence and learning adaptability (Chen & Wei, 2025), while AI-enabled international collaboration has supported cultural reflection and intercultural engagement (Sun, 2025). Studies of AI-supported cross-cultural learning have also reported outcomes involving cross-cultural understanding, culturally situated writing, learning behaviour, and personalised interaction (Hwang et al., 2026; Shadiev et al., 2026). Research on conversational agents and intelligent language-learning systems has similarly connected AI use with intercultural awareness, cultural adaptability, and communication across cultural boundaries (Hastomo et al., 2025; Ma & Yang, 2025; Xia et al., 2024). These findings suggest that AI may support intercultural learning when combined with culturally situated tasks, reflection, collaboration, and pedagogical guidance.

However, AI-mediated interaction is not culturally neutral. Machine-generated translations and responses may differ in cultural sensitivity and contextual appropriateness (Chen & Lin, 2025), while AI systems can reproduce dominant linguistic norms, simplified cultural categories, and stereotypes embedded in their training data (Dai & Zhu, 2025). Dai et al. (2025) further demonstrate that interaction with LLM-powered chatbots may reinforce culturally essentialised narratives and therefore requires Critical

Interactional Competence. Critical scholarship also questions whether AI can independently sustain intercultural dialogue when cultural knowledge is separated from lived experience, social positioning, and human relationships (Ferri & Simpson, 2026). AI-mediated language learning must consequently be examined in relation to learner agency, cultural representation, pedagogical mediation, human interaction, and bias, rather than technological affordances alone.

Despite growing interest, the relationship between AI-mediated language learning and intercultural competence in higher education remains insufficiently consolidated. Existing reviews have focused primarily on linguistic development, chatbot-supported practice, learner engagement, technology adoption, and instructional efficiency (Alhusaiyan, 2025; Chua & Annamalai, 2025; Du & Daniel, 2024; Zhu & Wang, 2025). Although Klimova and Chen (2024) reviewed AI and information and communication technologies in relation to university students' intercultural communication competence, their review covered literature only up to July 2024, combined AI with broader ICT interventions, and included studies not specifically focused on AI-mediated language learning. The present review therefore focuses on peer-reviewed empirical studies connecting AI-mediated language learning with explicit intercultural outcomes in higher education. It examines the technologies and pedagogical designs used, the outcomes reported and assessed, and the opportunities, limitations, and contextual conditions shaping learning beyond linguistic fluency.

Research Questions

- How have AI-mediated language-learning technologies and pedagogical designs been used to support intercultural competence among learners in higher education?
- What intercultural competence outcomes are reported in the included studies, and how are these outcomes conceptualised and assessed?
- What pedagogical affordances, limitations, and contextual conditions shape the contribution of AI-mediated language learning to intercultural competence in higher education?

Research Objectives

- To identify and synthesise the AI-mediated language-learning technologies, pedagogical designs, learner populations, and higher-education contexts examined in the included studies.
- To examine the intercultural competence outcomes reported in the included studies and the conceptual and methodological approaches used to assess them.
- To analyse the recurring pedagogical affordances, limitations, and contextual conditions associated with the use of AI-mediated language learning for intercultural competence development in higher education.

LITERATURE REVIEW

Intercultural Competence in Language Learning

Intercultural competence extends beyond linguistic proficiency to include the attitudes, knowledge, interpretive skills, and context-sensitive behaviours required for interaction across cultural differences. Byram (2021) conceptualises intercultural communicative competence through attitudes of openness, cultural knowledge, skills of interpreting, relating, discovery, and interaction, together with critical cultural awareness. Similarly, Deardorff's (2006) process model presents intercultural competence as an iterative development from attitudes and knowledge towards appropriate and effective intercultural behaviour. These perspectives indicate that language accuracy alone does not constitute intercultural competence; learners must also interpret culturally situated meanings, consider alternative perspectives, and adjust communication to particular relationships and contexts.

Language-learning research has consequently placed increasing emphasis on pragmatic appropriateness, cultural reflection, and interactional experience (Schauer, 2024). Recent scholarship also shows a broader movement from culture as factual knowledge towards culture as a negotiated and context-dependent process (Cong-Lem, 2025). For example, virtual exchanges can create opportunities for perspective-taking and cultural awareness through sustained human interaction (Matsumoto, 2026). Such findings provide an important point of comparison for AI-mediated learning: AI may increase access to intercultural encounters, but exposure to culturally diverse content does not necessarily demonstrate the development of intercultural competence.

AI-Mediated Language Learning in Higher Education

AI-mediated language learning encompasses the use of chatbots, conversational agents, intelligent tutoring systems, adaptive applications, machine translation, automated feedback, and other AI-supported environments that directly mediate language-learning processes. Reviews generally associate these technologies with personalised support, immediate feedback, repeated practice, and lower-pressure opportunities for language production (Alhusaiyan, 2025; Chua & Annamalai, 2025; Du & Daniel, 2024; Zhu & Wang, 2025). These affordances can be particularly relevant in higher education, where learners differ in linguistic backgrounds, confidence, learning goals, and access to intercultural interaction.

However, the educational value of AI depends on more than the technical availability of a tool. Students' perceptions of usefulness, trust, language confidence, and institutional support influence their willingness to engage with AI-mediated learning (Benek, 2025; Ittefaq et al., 2025). Machine translation and generative systems may reduce immediate linguistic barriers, but they can also simplify pragmatic meanings or produce culturally decontextualised responses (Chen & Lin, 2025). McCallum (2024), for example, illustrates how AI can support telecollaboration task design, but the study presents a pedagogical model rather than empirical evidence of learner outcomes. AI affordances must therefore be distinguished from demonstrated effects on intercultural competence.

AI-Mediated Language Learning and Intercultural Competence

A developing body of empirical research has begun to connect AI-mediated language learning with intercultural outcomes. Chang (2023) found that AI-chatbot-supported Tourism English instruction contributed to aspects of intercultural communicative competence, particularly respect for cultural differences and attentiveness during interaction. Subsequent studies have examined how conversational agents, contextualised simulations, and AI-supported collaborative activities may encourage cultural awareness, perspective-taking, and communication across linguistic differences (Hastomo et al., 2025; Liu, 2025; Ma & Yang, 2025; Sun, 2025; Xia et al., 2024).

The emerging evidence also suggests that outcomes are shaped by the interaction between technological, pedagogical, and learner-related factors. Chen and Wei (2025) identify cultural adaptability as an important mechanism connecting AI-assisted learning with cross-cultural competence. Wang and Gao (2025) similarly report that AI-mediated interaction predicts intercultural communication competence, while enjoyment, trust, and instructor competence influence this relationship. Two linked studies by Hwang et al. (2026) and Shadiev et al. (2026) further demonstrate how AI-supported cross-cultural learning can be examined through complementary learner and instructional outcomes; because they report the same broader project, they should be treated as linked reports rather than independent bodies of evidence.

Evidence from the wider higher-education context provides additional, although less direct, support. Sarwari et al. (2024) found that postgraduate students perceived AI as useful for managing language barriers, obtaining cultural information, and communicating in a multicultural university environment. Nevertheless, this study examines students' general use of AI rather than a designed language-learning intervention. Its findings are therefore valuable for contextualising learner experiences but should not be treated as direct evidence that AI-mediated language instruction develops intercultural competence.

Pedagogical and Critical Conditions

The literature identifies several conditions that may determine whether AI-mediated language learning moves beyond fluency practice. Culturally situated tasks, opportunities for reflection, collaborative dialogue, and instructor facilitation appear central to transforming AI-generated interaction into intercultural learning (McCallum, 2024; Sun, 2025). Learner adaptability, enjoyment, trust, and willingness to question AI output can further shape engagement and outcomes (Chen & Wei, 2025; Wang & Gao, 2025). This suggests that AI should be understood as one component of a broader learning design rather than an autonomous intercultural instructor.

Critical concerns include cultural stereotyping, inadequate contextualisation, overreliance on automated responses, unequal access, and uncertainty about the cultural assumptions embedded in AI-generated language (Dai & Zhu, 2025; Duke, 2026; Ferri & Simpson, 2026). AI systems can reproduce dominant linguistic and cultural representations while presenting their responses as neutral. Consequently, the capacity to evaluate, contextualise, and challenge AI-generated meanings is itself becoming an important dimension of intercultural learning.

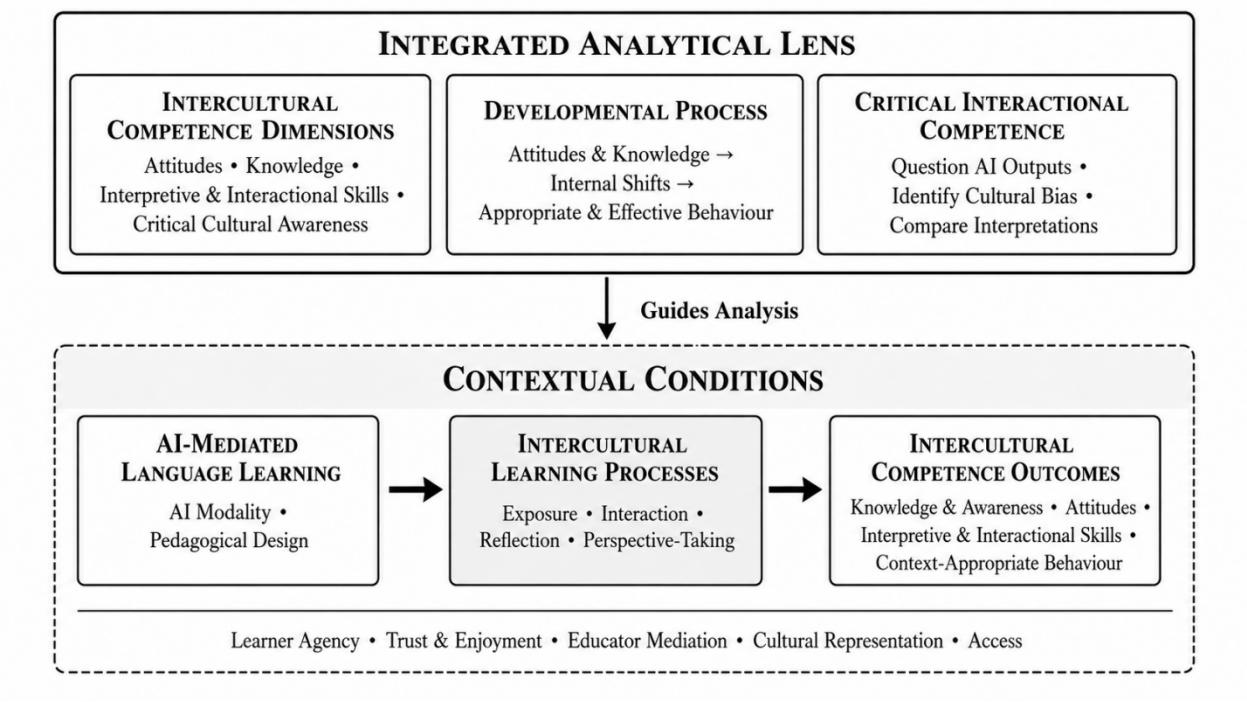
Theoretical Framework

This review integrates Byram's (2021) model of intercultural communicative competence with Deardorff's (2006) process model. Byram's framework provides analytical dimensions for examining attitudes, cultural knowledge, interpretive and interactional skills, and critical cultural awareness. Deardorff's model complements this structure by explaining competence as a developmental and iterative movement from attitudes and knowledge towards internal shifts in perspective and externally observable, context-appropriate communication.

Based on these models, intercultural competence is used in this review as an umbrella analytical construct encompassing related terms such as intercultural communicative competence, cross-cultural competence, cultural awareness, and intercultural sensitivity. These concepts are not treated as interchangeable outcomes. Instead, the review distinguishes between exposure to cultural content, learners' perceptions of improvement, changes in attitudes or awareness, and measured interactional competence. This distinction prevents improvements in language performance or access to cultural information from being interpreted automatically as evidence of intercultural competence.

To address the specific role of AI, the framework incorporates Critical Interactional Competence, or CritIC (Dai et al., 2025). CritIC emphasises learners' ability to question AI-generated cultural representations, identify stereotypes and omissions, compare alternative interpretations, and avoid treating algorithmic responses as culturally authoritative. The resulting framework therefore examines how AI modality and pedagogical design relate to intercultural knowledge, attitudes, interpretive skills, and communication behaviours, while considering learner agency, trust, educator mediation, cultural representation, and access as contextual conditions.

Figure 1.
Integrated Analytical Framework for AI-Mediated Language Learning and Intercultural Competence



RESEARCH METHOD

Research Design

This study adopted a systematic literature review design to examine how AI-mediated language learning has been used to support intercultural competence in higher education. The review was reported in accordance with PRISMA 2020, while the search process was documented with reference to PRISMA-S (Page et al., 2021; Rethlefsen et al., 2021). A narrative thematic synthesis was selected because the eligible studies differed substantially in research design, learner population, AI application, pedagogical setting, and measurement of intercultural competence. These differences made statistical pooling inappropriate.

Eligibility Criteria

The eligibility criteria were derived from the review title and research questions. Studies were required to examine AI as a substantive component of language learning in higher education and to address an explicit intercultural construct or outcome. International-student status was not required because the review concerned higher-education language learners more broadly.

Table 1
Eligibility Criteria

Criterion	Inclusion	Exclusion
Publication period	Published from 1 January 2023 to 31 July 2026	Published outside this period
Publication type	Peer-reviewed journal article	Conference paper, dissertation, editorial, book chapter, or other grey literature
Language	Complete report available in English	Full report not available in English
Population	Higher-education language learners; mixed samples where higher-education findings were separately extractable	School-only populations, non-learner populations, or inseparable mixed samples
AI involvement	AI used directly in language-learning activities, interaction, feedback, translation, assessment, or learner support	AI absent, incidental, proposed only, or limited to technical system performance
Intercultural relevance	Explicit intercultural competence, cultural awareness, intercultural sensitivity, sociocultural competence, intercultural pragmatics, cultural adaptability, or culturally appropriate communication	Linguistic, affective, engagement, or technology-acceptance outcomes without a substantive intercultural dimension
Evidence type	Primary empirical learner study	Review, conceptual, teacher-only, AI-output, or material-analysis study without learner-level evidence

Reviews, conceptual articles, teacher-only studies, and analyses of AI-generated materials were not included in the core evidence synthesis. Where relevant, they were retained separately to inform the background, theoretical framing, or interpretation of the findings.

Search Strategy

The literature search was conducted in Scopus, Web of Science Core Collection, and ERIC in July 2026, with studies published up to 31 July 2026 considered eligible for inclusion.; records published after that date were outside the review window. These databases were selected for their complementary coverage of language education, educational technology, applied linguistics, and interdisciplinary research.

The search combined three concept blocks: AI-mediated technologies, language learning, and intercultural competence. Higher education was applied as an eligibility criterion rather than a mandatory search block to avoid losing relevant studies whose titles and abstracts did not identify the educational level.

Table 2

Database search strategies and records retrieved

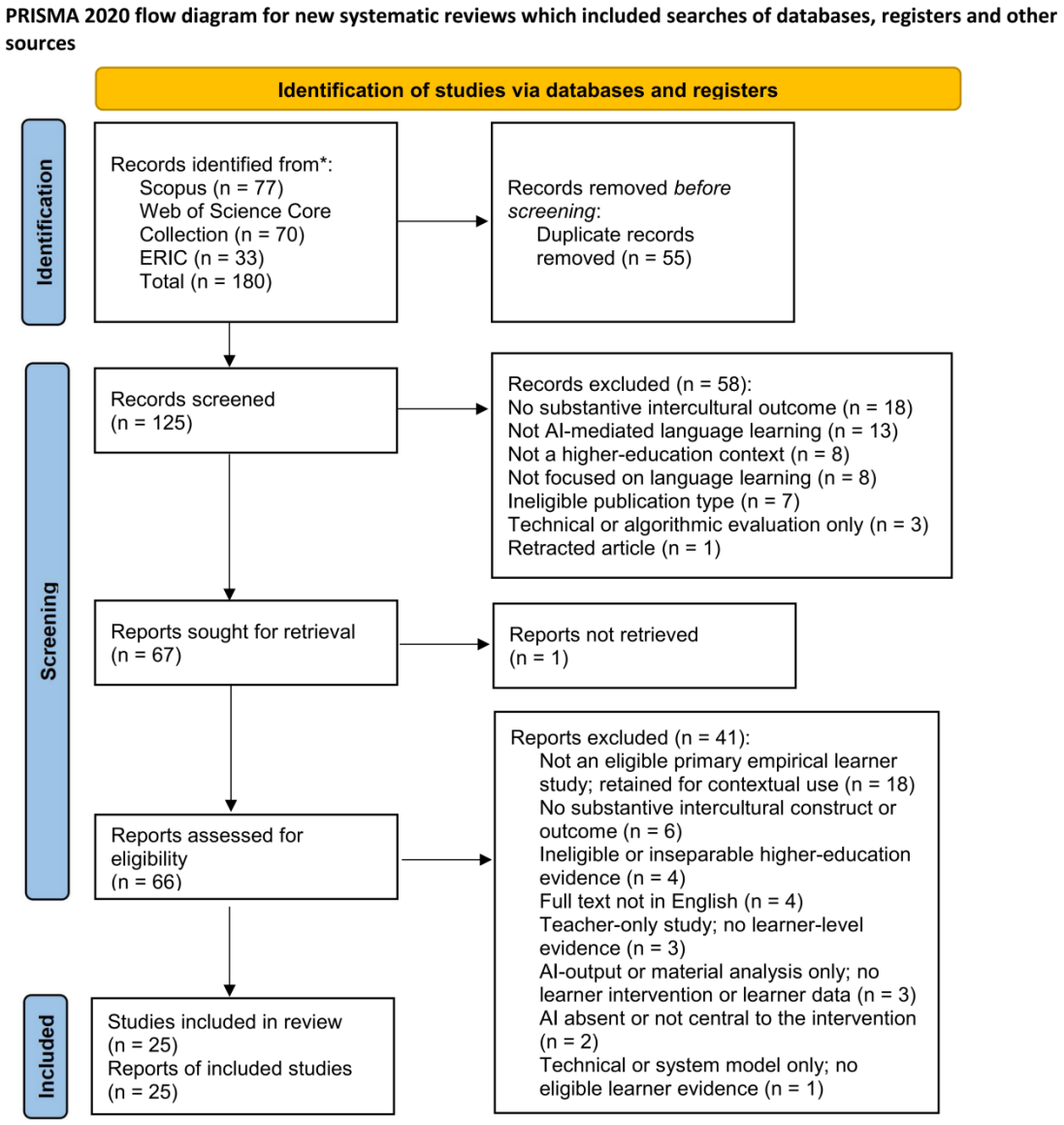
Database	Search field and search strategy	Limits applied	Records retrieved
Scopus	TITLE-ABS-KEY ((“artificial intelligence” OR “generative artificial intelligence” OR “generative AI” OR GenAI OR “large language model*” OR LLM* OR ChatGPT OR chatbot* OR “conversational AI” OR “conversational agent*” OR “AI-mediated” OR “AI-assisted” OR “AI-supported” OR “AI-enhanced” OR “AI-enabled” OR “AI-powered” OR “intelligent tutoring system*” OR “adaptive learning system*” OR “machine translation” OR “neural machine translation” OR “speech recognition”) AND (“language learn*” OR “language education” OR “language teach*” OR “language acquisition” OR “second language*” OR “foreign language*” OR EFL OR ESL OR “L2 learn*” OR “English language learn*” OR “computer-assisted language learning”) AND (“intercultural competence” OR “intercultural communicative competence” OR “intercultural communication competence” OR “cross-cultural competence” OR “cross-cultural communication competence” OR “cross-cultural communication” OR “intercultural communication” OR “cross-cultural understanding” OR “intercultural awareness” OR “cultural awareness” OR “intercultural sensitivity” OR “cultural sensitivity” OR “critical cultural awareness” OR “intercultural learning” OR “intercultural pragmatic competence” OR “cross-cultural critical thinking”))	Publication years: 2023–2026; journal articles; English language	77
Web of Science Core Collection	TS=(“artificial intelligence” OR “generative artificial intelligence” OR “generative AI” OR GenAI OR “large language model*” OR LLM* OR ChatGPT OR chatbot* OR “conversational AI” OR “conversational agent*” OR “AI-mediated” OR “AI-assisted” OR “AI-supported” OR “AI-enhanced” OR “AI-enabled” OR “AI-powered” OR “intelligent tutoring system*” OR “adaptive learning system*” OR “machine translation” OR “neural machine translation” OR “speech recognition”) AND TS=(“language learn*” OR “language education” OR “language teach*” OR “language acquisition” OR “second language*” OR “foreign language*” OR EFL OR ESL OR “L2 learn*” OR “English language learn*” OR “computer-assisted language learning”) AND TS=(“intercultural competence” OR “intercultural communicative competence” OR “intercultural communication competence” OR “cross-cultural competence” OR “cross-cultural communication competence” OR “cross-cultural communication” OR “intercultural communication” OR “cross-cultural understanding” OR “intercultural awareness” OR “cultural awareness” OR “intercultural sensitivity” OR “cultural sensitivity” OR “critical cultural awareness” OR “intercultural learning” OR “intercultural pragmatic competence” OR “cross-cultural critical thinking”)	Publication years: 2023–2026; document type: article; English language	70
ERIC	(“artificial intelligence” OR “generative AI” OR ChatGPT OR chatbot OR chatbots OR “large language model” OR “large language models” OR “conversational agent” OR “conversational agents” OR “AI-mediated” OR “AI-assisted” OR “AI-supported” OR “AI-powered” OR “intelligent tutoring system” OR “intelligent tutoring systems” OR “machine translation”) AND (“language learning” OR “language education” OR “language teaching” OR “language acquisition” OR “second language” OR “foreign language” OR EFL OR ESL) AND (“intercultural competence” OR “intercultural communicative competence” OR “intercultural communication” OR “cross-cultural competence” OR “cross-cultural communication” OR “cross-cultural understanding” OR “intercultural awareness” OR “cultural awareness” OR “intercultural sensitivity” OR “critical cultural awareness”)	Publication years: 2023–2026; publication type: journal article	33
Total before deduplication	—	—	180

Study Selection

All records were combined in a structured screening database. Duplicates were identified through DOI matching, normalised-title comparison, and manual checks of author, year, journal, and URL information. Fifty-five duplicate records were removed, leaving 125 unique records for title and abstract screening. The complete selection process is presented in Figure 2

Figure 2

PRISMA 2020 Flow Diagram of the Study Selection Process



Screening was conducted in two stages using the predetermined criteria. At the first stage, 58 records were excluded because they clearly failed to meet the population, AI-involvement, language-learning, intercultural-relevance, publication-type, or other eligibility requirements. Records with

insufficient information were retained for full-text assessment rather than excluded prematurely. This produced 67 reports for retrieval.

One report could not be retrieved in full. The remaining 66 reports were assessed, of which 41 were excluded. The main reasons were an ineligible evidence type (n = 18), absence of a substantive intercultural construct or outcome (n = 6), an ineligible or inseparable higher-education population (n = 4), non-English full text (n = 4), teacher-only evidence (n = 3), AI-output or material analysis without learner data (n = 3), AI being absent or peripheral to the intervention (n = 2), and a technical system focus without eligible learner evidence (n = 1). The first reviewer completed the title and abstract screening and the full-text eligibility assessment. The second reviewer subsequently re-examined all 66 retrieved full-text reports and verified the inclusion and exclusion decisions, including the recorded reasons for exclusion, against the predefined eligibility criteria. Any disagreements were resolved through discussion and consensus.Twenty-five primary empirical studies met all criteria and formed the final evidence base.

Data Extraction

A structured extraction matrix was developed around the three research questions. For each included study, the matrix recorded bibliographic information, country and institutional context, learner population, target language, research design, sample size, AI technology, pedagogical design, duration of use, conceptualisation and assessment of intercultural competence, reported learner experiences and outcomes, pedagogical affordances, limitations, and relevant contextual conditions.

For the first research question, the review extracted the AI-mediated technologies, pedagogical designs, learner populations, target languages, and higher-education contexts examined in each study. For the second question, the review extracted how intercultural competence was defined, measured, and represented in the findings. Outcomes were examined in relation to the cognitive, affective, and behavioural dimensions established in the theoretical framework (Byram, 2021; Deardorff, 2006). Evidence concerning pedagogical support, learner agency, cultural representation, bias, trust, access, and human facilitation was extracted for the third question.

Data Synthesis

The 25 included studies were synthesised using an integrated narrative and thematic approach. Following Thomas and Harden (2008), relevant findings were coded, organised into descriptive categories, and then developed into analytical themes. Initial coding was guided by the research questions and the cognitive, affective, and behavioural dimensions of intercultural competence. Inductive codes were retained when the studies reported issues not adequately captured by those categories.

Quantitative findings were summarised according to the direction and nature of reported outcomes, rather than converted into a pooled effect estimate. Qualitative findings were used to examine learner experiences, pedagogical mechanisms, and contextual explanations. Findings from different designs were compared for convergence, divergence, and gaps. This procedure allowed the synthesis to examine not only whether AI-mediated language learning was associated with intercultural outcomes, but also how those outcomes were produced, assessed, and constrained in higher-education settings.

RESULTS

Study Characteristics

The 25 included studies were published between 2024 and July 2026, with 15 published in 2026, eight in 2025, and two in 2024. Among studies reporting a clear total, sample sizes ranged from 9 to 477 participants. Most participants were undergraduate or postgraduate language learners, although the studies also included adult learners in online higher education, international students, tourism students, and learners involved in virtual exchange or service-learning projects. The studies were concentrated in Asian higher-

education contexts, particularly China and Southeast Asia. English was the most common target language, while other areas included Japanese business writing, French for specific purposes, Russian as a foreign language, Indonesian for international students, and the translation of ethnocultural expressions between Kazakh and English. The characteristics and principal findings of the included studies are presented in Table A1 in Appendix A.

AI-Mediated Technologies and Pedagogical Designs

Seventeen of the 25 studies used ChatGPT, GPT-4, DeepSeek, another large language model, or an AI-powered conversational agent as a central component of language learning. The remaining studies used natural language processing, speech recognition, machine translation, adaptive learning, intelligent pairing, virtual reality, or multimodal language systems. Four recurring pedagogical designs were identified, as summarised in Table 3.

Table 3

AI-Mediated Technologies and Pedagogical Designs Identified Across the Included Studies

Synthesised category	AI technologies	Pedagogical design and use	Learners and contexts	Representative studies
Individualised practice and feedback	ChatGPT, GPT-4, automated feedback, and machine translation	Pragmatic practice, culturally appropriate writing, translation, personalised feedback, and metacognitive reflection	EFL learners, non-English majors, translation students, adult online learners, and language-faculty students	Akhrenova and Moradkhani (2026); Dinh (2025); Park and Kwon (2026); Syakur et al. (2026)
Simulated and immersive communication	Voice-based GenAI, NLP, speech recognition, adaptive systems, and AI-enhanced VR	Global simulation, culturally situated role-play, sociopragmatic dialogue, adaptive remediation, and immersive communication	Undergraduate and postgraduate EFL learners, linguistics students, and advanced language learners	Huang et al. (2026); Khakimova et al. (2026); Li et al. (2026); Liu (2025); Niu (2026); Qu and Chen (2026); Young et al. (2026)
AI-supported intercultural collaboration	Generative AI, chatbots, AI-supported language tools, and digital storytelling tools	COIL, virtual-exchange preparation, multilingual projects, and service learning	Learners working with culturally diverse peers, international partners, or community participants	Cheung and Shi (2024); Qiu et al. (2026); Stroud et al. (2026); Sun (2025)

Cultural inquiry, translation, and material development	DeepSeek, ChatGPT, AI translation systems, generative AI, and AI–AR resources	Critical reading, cultural research, ethnocultural translation, cultural-content exploration, and culturally contextualised material development	Learners of Russian, French, tourism English, Indonesian, and ethnocultural translation	Antonova (2026); Drewelow (2026); Hastomo et al. (2025); Mahmoudi-Dehaki and Nasr-Esfahani (2026); Nurlina et al. (2025); Ryskulbek et al. (2026)

Note. AR = augmented reality; COIL = Collaborative Online International Learning; EFL = English as a Foreign Language; GenAI = generative artificial intelligence; NLP = natural language processing; VR = virtual reality. Categories are not mutually exclusive.

The duration and intensity of AI use varied across the studies. Controlled and mixed-methods interventions generally lasted between four and twelve weeks, whereas qualitative and development-oriented studies examined shorter tasks, course-based experiences, or learner reflections. AI functioned as the main interaction partner in some studies and as one component of a broader teaching design in others. In COIL, virtual exchange, and service learning, AI-mediated support was combined with interaction involving culturally diverse peers or community participants.

Intercultural Competence Outcomes, Conceptualisations, and Assessment Approaches

Intercultural competence was conceptualised either as a multidimensional construct or through more specific intercultural outcomes. Multidimensional approaches included cultural knowledge, attitudes, sensitivity, communication skills, awareness, and behavioural adaptability. More focused constructs included sociocultural competence, intercultural pragmatic competence, cultural adaptability, cognitive flexibility, critical cultural awareness, and culturally appropriate communication.

Assessment methods included pre- and post-intervention scales, adapted intercultural-competence questionnaires, performance rubrics, culturally situated tasks, learner surveys, interaction logs, interviews, focus groups, reflective journals, classroom observations, and analysis of learner-produced texts or conversations. Table 4 presents the main outcome categories and the methods used to assess them.

Table 4

Intercultural Competence Outcomes, Conceptualisations, and Assessment Approaches

Outcome category	Conceptualisation	Assessment approaches	Reported results	Representative studies
Multidimensional intercultural competence	Cultural knowledge and awareness, attitudes, sensitivity, communication skills, and behavioural adaptability	Pre–post scales, adapted Byram questionnaires, intercultural cases, performance rubrics, interviews, and observations	Structured interventions generally reported improvements across several dimensions. The AI-plus-metacognitive-scaffolding group in Akhrenova and Moradkhani (2026) improved by 12.6 points, compared with 5.9 in the AI-only group and 3.1 in the traditional group.	Akhrenova and Moradkhani (2026); Liu (2025); Ma and Yang (2025); Qiu et al. (2026); Sun (2025)

Cognitive outcomes	Cultural knowledge, critical cultural awareness, perspective shifting, bias recognition, and cultural interpretation	Cultural cases, interviews, reflection, critical-reading tasks, translation analysis, and interaction logs	Learners identified incomplete or biased cultural representations, recognised limitations in literal translation, and used additional sources to verify AI output. Perspective shifts were reported but were limited in some studies.	Antonova (2026); Cheung and Shi (2024); Drewelow (2026); Hastomo et al. (2025); Ryskulbek et al. (2026)
Affective outcomes	Openness, intercultural sensitivity, confidence, engagement, willingness to communicate, and anxiety	Self-report scales, questionnaires, interviews, and learner reflections	Studies reported improvements in attitudes, sensitivity, confidence, and willingness to communicate. Lower speaking or interaction anxiety was reported in AI-supported role-play and virtual-exchange preparation.	Liu (2025); Ma and Yang (2025); Qu and Chen (2026); Stroud et al. (2026); Sun (2025)
Behavioural and pragmatic outcomes	Pragmatic appropriateness, politeness, mitigation, discourse flexibility, communication strategies, meaning negotiation, and culturally responsive language use	Speaking tasks, performance rubrics, role-play, pragmatic tasks, interaction corpora, and translation activities	Positive changes were reported in simulation, pragmatic-feedback, role-play, and collaborative-learning studies. Young et al. (2026) reported increases of 32.8% in the AI group and 12.3% in the control group.	Khakimova et al. (2026); Kecskés and Dinh (2025); Qu and Chen (2026); Syakur et al. (2026); Young et al. (2026)
Narrow, exploratory, or non-significant outcomes	Cultural comprehension, sociocultural awareness, interaction readiness, intercultural awareness, or ICC as a secondary outcome	User-experience surveys, awareness measures, exploratory performance instruments, and within-AI-condition comparisons	Niu (2026) found no significant ICC differences among three AI-enhanced VR conditions. Li et al. (2026) treated ICC as exploratory, with cross-group measurement comparability not established.	Li et al. (2026); Niu (2026); Park and Kwon (2026); Stroud et al. (2026); Yu et al. (2025); Zheng and Lei (2024)

Note. ICC = intercultural communicative competence; VR = virtual reality.

Pedagogical Affordances, Limitations, and Contextual Conditions

The thematic synthesis identified recurring affordances related to personalised support, low-pressure practice, intercultural participation, learner agency, and critical AI literacy. It also identified cultural, interactional, technical, and learner-related limitations. The contribution of AI differed according to the pedagogical and contextual conditions surrounding its use. These findings are summarised in Table 5.

Table 5

Pedagogical Affordances, Limitations, and Contextual Conditions

Type	Synthesised theme	Evidence reported across the included studies	Representative studies
Affordance	Immediate and personalised support	AI provided rapid feedback, repeated practice, personalised language assistance, and support for culturally appropriate writing, translation, and pragmatic choices.	Dinh (2025); Mahmoudi-Dehaki and Nasr-Esfahani (2026); Park and Kwon (2026); Syakur et al. (2026)
Affordance	Low-pressure practice and expanded participation	Conversational agents enabled rehearsal without immediate peer evaluation. Chatbot preparation was associated with greater confidence, willingness to communicate, and readiness for intercultural exchange.	Hastomo et al. (2025); Qu and Chen (2026); Stroud et al. (2026)
Affordance	Intercultural collaboration and contextualised communication	AI supported COIL, virtual exchange, multilingual teamwork, service learning, and culturally contextualised language tasks.	Cheung and Shi (2024); Qiu et al. (2026); Stroud et al. (2026); Sun (2025)
Affordance	Learner agency and critical AI literacy	Learners compared AI systems, used back-translation, consulted external sources, identified bias or missing information, and revised AI-generated content.	Cheung and Shi (2024); Hastomo et al. (2025); Ryskulbek et al. (2026)
Limitation	Inconsistent cultural representation	AI output included literal translation, loss of idiomatic meaning, cultural simplification, uncertain authenticity, and stereotypical representations.	Akhrenova and Moradkhani (2026); Drewelow (2026); Ryskulbek et al. (2026)
Limitation	Pragmatic and interactional constraints	AI sometimes failed to maintain relevance, perform interactional repair, represent paralinguistic information, or handle politeness and indirectness consistently.	Kecskés and Dinh (2025); Qu and Chen (2026); Syakur et al. (2026)
Limitation	Overreliance and reduced independent evaluation	Learners reported the need to verify AI-generated translations, cultural explanations, and feedback rather than accept them directly.	Dinh (2025); Drewelow (2026); Park and Kwon (2026); Ryskulbek et al. (2026)
Limitation	Technical, access, and digital-literacy constraints	Technical instability, interface usability, limited conversational depth, unequal access, and differences in digital literacy affected learner participation and reported usefulness.	Stroud et al. (2026); Yu et al. (2025)
Contextual condition	Pedagogical scaffolding and human mediation	Metacognitive prompts, instructor feedback, guided reflection, and human verification accompanied stronger or more clearly reported intercultural outcomes.	Akhrenova and Moradkhani (2026); Hastomo et al. (2025); Mahmoudi-Dehaki and Nasr-Esfahani (2026); Park and Kwon (2026)

Contextual condition	Cultural contextualisation and authentic interaction	Studies incorporated culturally situated tasks, immersive scenarios, culturally diverse partners, or community interaction alongside AI support.	Cheung and Shi (2024); Huang et al. (2026); Qiu et al. (2026); Sun (2025)
Contextual condition	Learner and task characteristics	Language proficiency, prompt design, tolerance for ambiguity, digital literacy, task duration, and access to intercultural partners varied across the included studies.	Drewelow (2026); Stroud et al. (2026)
Contextual condition	Outcome selection and measurement	Findings were represented through self-reported, performance-based, qualitative, or exploratory indicators, with differences in construct coverage and cross-group comparability.	Li et al. (2026); Niu (2026); Qu and Chen (2026)

Note. COIL = Collaborative Online International Learning; AI = artificial intelligence.

DISCUSSION

This review shows that the contribution of AI-mediated language learning to intercultural competence depends less on the technology itself than on its pedagogical use. Across the included studies, AI expanded opportunities for language practice, feedback, simulation, translation, and cultural inquiry. However, intercultural development was more evident when these functions were combined with cultural contextualisation, reflective tasks, collaborative exchange, and human mediation. Improved fluency, engagement, or confidence should therefore not be treated automatically as evidence of intercultural competence.

Pedagogical Designs and the Role of AI

The included studies were dominated by ChatGPT, large language models, and conversational agents, but no single technology was consistently more effective than another. Similar tools produced different outcomes depending on the learning task, cultural content, instructional scaffolding, and opportunities for interaction. This finding extends previous reviews that have mainly emphasised personalised feedback, speaking practice, engagement, and instructional efficiency (Du & Daniel, 2024; Chua & Annamalai, 2025; Zhu & Wang, 2025).

AI-supported activities became interculturally meaningful when learners were required to compare perspectives, examine culturally situated language choices, recognise bias, and revise their interpretations. Studies involving metacognitive scaffolding, culturally contextualised simulations, COIL, and virtual exchange therefore reported clearer intercultural outcomes than unstructured AI practice (McCallum, 2024; Sun, 2025; Hwang et al., 2026; Shadiev et al., 2026). Akhrenova and Moradkhani (2026), for example, found stronger development when AI use was combined with metacognitive guidance. The intercultural value of AI thus lies primarily in the activity organised around the tool rather than in the tool alone.

AI-supported role-play also provided repeated, low-pressure opportunities to practise unfamiliar situations. This was useful for learners who lacked access to culturally diverse interlocutors or experienced communication anxiety. Nevertheless, simulations were more effective when they contained an explicit cultural issue, a communicative goal, and a reflective component. Otherwise, learners could complete a task through linguistically acceptable responses without examining the cultural assumptions involved.

Intercultural Outcomes and Their Assessment

The reported outcomes covered cognitive, affective, and behavioural dimensions. Cognitive outcomes included cultural knowledge, perspective awareness, bias recognition, and critical reflection. Affective outcomes included openness, sensitivity, confidence, and willingness to communicate, while behavioural outcomes concerned pragmatic appropriateness, politeness, discourse flexibility, and negotiation strategies.

These dimensions broadly correspond to Byram's (2021) account of attitudes, knowledge, interpretive and interactional skills, and critical cultural awareness, as well as Deardorff's (2006) process model of intercultural competence. However, the evidence was stronger for cultural awareness, openness, confidence, and reflection than for sustained behavioural change. Awareness and reduced anxiety may support intercultural development, but they do not demonstrate that learners can communicate appropriately in unpredictable intercultural encounters.

Differences in assessment further complicated comparison. Some studies used multidimensional intercultural competence scales, while others measured cultural awareness, anxiety, willingness to communicate, or perceived competence. Interviews, journals, performance rubrics, interaction logs, and learner texts were also used. These measures capture related but distinct constructs. Self-reported improvement therefore cannot be interpreted in the same way as observable pragmatic adaptation. The mixed results across the studies suggest that reported effectiveness depends partly on how intercultural competence is defined, measured, and distinguished from general language improvement.

Affordances, Limitations, and Contextual Conditions

AI provided accessible and repeatable opportunities to request explanations, compare expressions, rehearse interactions, and receive immediate feedback. These features help explain the improvements in engagement, confidence, and willingness to communicate reported in several studies. At the same time, learners encountered simplified cultural explanations, literal translations, stereotypical representations, uncertain authenticity, and weaknesses in interactional repair and meaning negotiation.

These limitations challenge the assumption that AI can act as a neutral cultural authority. Fluent output may conceal bias, inaccurate generalisations, or decontextualised cultural knowledge. Dai et al. (2025) therefore propose Critical Interactional Competence, through which learners question how AI constructs cultural knowledge, compare its responses with other sources, and recognise when human judgement is required. This position is consistent with Ferri and Simpson's (2026) argument that AI can simulate cultural perspectives but cannot reproduce the relational responsibility and uncertainty of human intercultural dialogue.

Human mediation consequently emerged as a central condition. Teacher feedback, diverse peers, collaborative activities, and opportunities to verify AI output helped learners use AI as a resource rather than an authority. Language proficiency, prompt design, digital literacy, ambiguity tolerance, access to technology, and task duration also influenced outcomes. The same tool may therefore encourage either critical engagement or overreliance, depending on the learner and instructional context.

Implications for Higher and International Education

AI-mediated tools may assist students in managing unfamiliar academic conventions, pragmatic expectations, and everyday communication. Nevertheless, adoption is shaped by perceived value, trust, attitudes, and AI literacy rather than access alone (Ittefaq et al., 2025). Universities should therefore connect AI-supported activities with guided reflection, culturally diverse interaction, and explicit discussion of bias and representation.

Matsumoto's (2026) study of virtual exchange demonstrates the continuing importance of interaction with culturally diverse peers. AI may support preparation, language formulation, and post-task reflection, but it should not replace the human relationships through which intercultural understanding develops. Questions of inclusion are equally important because unequal access, differences in digital

literacy, and linguistic bias may reproduce existing educational inequalities. As Duke (2026) argues, AI use in international education should be evaluated in relation to inclusion, sustainability, and contextual appropriateness.

The findings support three pedagogical priorities. First, AI-supported tasks should include explicit intercultural objectives rather than assuming that language practice will produce intercultural learning. Second, learners should be required to verify and critique AI-generated cultural content. Third, AI practice should be connected to authentic human interaction and assessed through both reflection and observable communication.

Limitations and Future Research

The review was limited to English-language journal articles published between January 2023 and July 2026 and indexed in Scopus, Web of Science Core Collection, or ERIC. Relevant studies published in other languages or sources may have been missed. The concentration of studies in Asian and English-learning contexts also limits generalisability.

Differences in study design, intervention duration, population, and outcome measurement prevented statistical pooling. Future research should therefore adopt clearer definitions of intercultural competence and use longitudinal designs, delayed assessments, interactional analysis, and authentic performance tasks. Comparative studies should distinguish among AI-only learning, scaffolded AI use, human intercultural exchange, and combinations of these conditions. Research across a wider range of languages and cultural settings is also needed.

Overall, AI is better understood as an intercultural scaffold than as an autonomous intercultural educator. Its contribution becomes more credible when learners critically examine cultural representations, practise situated communication, and verify AI output through reflection and human interaction. Moving beyond fluency therefore requires using AI not simply to generate language, but to support critical, contextualised, and relational intercultural learning.

CONCLUSION

This systematic review shows that AI-mediated language learning can support intercultural competence in higher education, but its contribution is neither automatic nor limited to linguistic improvement. Positive outcomes were more evident when AI was embedded in culturally contextualised tasks, reflective activities, collaborative exchange, and human mediation. However, evidence for sustained behavioural transfer remains limited, while cultural simplification, bias, overreliance, and unequal access continue to constrain its educational value. AI should therefore be understood as an intercultural learning scaffold rather than a cultural authority or substitute for human interaction. Future pedagogy and research should combine AI use with explicit intercultural objectives, critical verification, authentic communication, and longitudinal performance-based assessment across more diverse languages and cultural settings. Used in this way, AI may help learners move beyond fluent language production towards more critical, contextualised, and relational intercultural communication.

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Appendix A

Table A1

Included Studies in the Review

Study	Context and participants	Research design	AI technology and pedagogical design	Intercultural construct and assessment	Main findings
Akhrenova and Moradkhani (2026)	Russia; 180 language-faculty undergraduates from three universities	Mixed-methods, three-group repeated-measures experiment; eight weeks	GPT-4 interaction with metacognitive-cultural scaffolding, AI-only use, and traditional instruction	Multicultural competence; adapted Byram questionnaires, intercultural cases, logs, interviews, and implicit association tests	Competence increased by 12.6 points in the scaffolded-AI group, compared with 5.9 in the AI-only group and 3.1 in the control group. Scaffolded learners identified AI cultural bias more frequently.
Khakimova et al. (2026)	Uzbekistan; 32 second-year university linguistics students	Quasi-experimental comparative study	Global simulation supported by NLP and speech recognition	Sociocultural competence; pre–post measures, validated rubrics, and interaction logs	The technology-supported group improved in intercultural awareness, context-sensitive language use, communicative adaptability, and pragmatic appropriateness.
Syakur et al. (2026)	Indonesia; 58 non-English-major undergraduates	Sequential mixed-methods intervention; six weeks	AI-generated formative feedback on online communication	Sociopragmatic awareness, politeness, and contextual appropriateness; feedback logs, questionnaire, and interviews	Learners showed greater awareness of audience, tone, speech acts, and mitigation, but some had difficulty interpreting nuanced feedback on politeness and indirectness.
Qiu et al. (2026)	30 postgraduate students in Russian- and Spanish-language programmes	Mixed-methods COIL intervention; four weeks	Generative-AI-supported multilingual COIL projects	Intercultural competence in multilingual teamwork; validated pre–post scales and learner reflections	Intercultural competence improved following the programme, with the most pronounced gains reported in mixed intercultural groups.
Antonova (2026)	China; B1+ university students studying Russian	Classroom pilot intervention and methodological evaluation	DeepSeek-supported critical reading of authentic Russian news	Critical cultural awareness, media literacy, and intercultural interpretation; task performance and classroom evaluation	Students demonstrated increased critical engagement with culturally situated news texts, more spontaneous language production, and greater attention to responsible AI use.
Li et al. (2026)	Four East Asian university sites; 245 EFL postgraduate students	Multisite randomised controlled trial; 12 weeks	Immersive simulation, intelligent pairing, and adaptive-learning designs	Intercultural communicative competence performance as an exploratory outcome	Intercultural-performance patterns broadly followed the language-proficiency results, but the outcome was exploratory and cross-group measurement comparability was not established.
Huang et al. (2026)	120 undergraduate EFL learners	Quasi-experimental intervention	AI-enhanced immersive learning with cultural contextualisation	Intercultural competence, English proficiency, and engagement; questionnaires, performance measures, and behavioural analytics	Learners in AI-enhanced immersive conditions achieved greater intercultural and language gains than comparison groups. The culturally contextualised condition produced the strongest results.

Park and Kwon (2026)	Online higher education; 27 adult learners, with 11 interview participants	Mixed-methods online-course intervention	ChatGPT-4o feedback for Japanese business writing	Sociocultural awareness, honorifics, politeness, and communication conventions; survey and interviews	Learners reported improved awareness of business communication conventions and culturally appropriate expressions, alongside concerns about overreliance and feedback reliability.
Stroud et al. (2026)	148 university students from multiple linguistic and cultural backgrounds	Mixed-methods virtual-exchange preparation study	Eduling chatbot practice before synchronous virtual exchange	Intercultural interaction readiness, anxiety, confidence, and willingness to communicate; survey and open responses	Learners reported increased confidence and willingness to communicate and reduced anxiety. Technical performance and limited conversational depth were recurring limitations.
Young et al. (2026)	120 advanced language learners; 60 experimental and 60 control participants	Quasi-experimental intervention; 12 weeks	GPT-4-generated sociopragmatic dialogues, role-play, and adaptive remediation	Cross-cultural communicative competence; pragmatic rubrics and standardised competence scale	Overall competence increased by 32.8% in the AI group and 12.3% in the control group. Pragmatic appropriateness, intercultural sensitivity, and discourse flexibility also improved.
Ryskulbek et al. (2026)	Kazakhstan; 20 undergraduates divided into Kazakh- and English-language groups	Qualitative comparative case study	ChatGPT, Google Translate, and Yandex Translate for ethnocultural expressions	Cultural awareness, intercultural sensitivity, and interpretation of ethnocultural units; translation tasks and interviews	Learners identified literal translation and loss of cultural meaning in idioms, proverbs, and metaphors. They used comparison, back-translation, contextual analysis, and external sources for verification.
Drewelow (2026)	14 advanced university French-for-specific-purposes students	Qualitative interview study	ChatGPT-supported research on French consumers and marketing	Cognitive flexibility and movement between emic and etic perspectives; interviews	Some learners experimented with unfamiliar cultural positions and showed limited perspective shifting. Concerns included authenticity, legitimacy, cultural positioning, and prompt design.
Mahmoudi-Dehaki and Nasr-Esfahani (2026)	142 undergraduate tourism students	Sequential explanatory controlled intervention	Forty ChatGPT-4o-generated English-for-tourism units with AI-supported oral feedback and human verification	Intercultural competence and culturally appropriate tourism communication; pre–post measures, focus groups, and observations	The AI group improved in intercultural competence and English proficiency. Focus-group and observation data highlighted culturally relevant materials and instructor mediation.
Qu and Chen (2026)	China; 59 undergraduate EFL learners	Quasi-experiment with qualitative follow-up; ten weeks	Voice-based GenAI interlocutors compared with peer role-play	Intercultural communicative competence, speaking performance, anxiety, and engagement; questionnaires, speaking tasks, logs, and interviews	The GenAI group achieved higher perceived competence and intercultural speaking performance and showed a greater reduction in anxiety. Missing paralinguistic cues remained a limitation.

Niu (2026)	China; 477 undergraduate EFL learners	Four-arm randomised controlled trial	NLP-, machine-learning-, and speech-analysis-enhanced immersive VR	Communication and intercultural competence; performance measures and mixed-effects ANCOVA	No significant differences in intercultural competence were found among the three AI-enhanced VR conditions. Intercultural outcomes were not directly compared with the traditional-instruction group.
Hastomo et al. (2025)	Indonesia; 15 undergraduates from five regions	Descriptive phenomenological study	AI-powered conversational agents for cultural inquiry	Cultural perspectives, intercultural learning, and critical AI literacy; semi-structured interviews	Learners moved from retrieving cultural facts to examining deeper values, described AI as non-judgemental, and verified uncertain content through additional sources.
Yu et al. (2025)	Western China; 100 international university students	Quasi-experiment and user-experience evaluation	ChatGPT-supported multilingual learning	Cultural understanding and multilingual learning experience; questionnaires and interviews	Learners reported personalised support and improved cultural comprehension. Limitations concerned interface usability, interaction naturalness, and conversational depth.
Kecskés and Dinh (2025)	45 Japanese and other-nationality language learners	Interaction-corpus study with learner participation	ChatGPT-simulated intercultural conversations	Intercultural pragmatic competence, meaning negotiation, and repair; more than 10,000 responses and learner feedback	ChatGPT modelled some cooperative behaviours but produced repetitive responses and had difficulty maintaining relevance and performing human-like interactional repair.
Nurlina et al. (2025)	Indonesia; 50 international BIPA students, with a small-group trial of five learners	Research-and-development study	Generative-AI- and AR-enhanced digital book	Intercultural literacy and Indonesian communication culture; survey, interviews, expert validation, and learner trial	Learners reported language and cultural adaptation difficulties and viewed the digital resource as useful for learning Indonesian communication practices.
Dinh (2025)	Vietnam; 62 junior English majors	Mixed-methods classroom study	ChatGPT-assisted translation	Cultural nuance and idiomatic appropriateness; surveys, course grades, journals, and focus groups	Learners reported improvements in translation accuracy, efficiency, motivation, and confidence, but identified problems with cultural nuance and idiomatic expressions.
Sun (2025)	China; 38 experimental and 39 control English majors, working with a Malaysian partner institution	Mixed-methods controlled intervention; 12 weeks	AI-enabled COIL	Intercultural competence, including attitudes, communication skills, and awareness; pre–post measures and interviews	The experimental group showed significant improvements in intercultural competence. Interviews also reported greater cross-cultural understanding and personal development.

Liu (2025)	262 language-related undergraduates, with a separate pilot of 50 learners	Randomised controlled experiment; three months	BERT-, Transformer-, AORBCO-, ASR-, TTS-, and VR-supported intelligent learning system	Cultural understanding, communication strategies, cultural sensitivity, and language proficiency; pre-, post-, and delayed measures	The experimental group improved across language and intercultural dimensions, with an overall score increase of 18.9 points and reported maintenance at delayed assessment.
Ma and Yang (2025)	China; 120 undergraduate EFL learners	Mixed-methods case-study intervention	AI-driven language and cultural-adaptability tools	Cultural knowledge, attitudinal openness, communication skills, and cultural awareness; surveys, interviews, observations, and platform records	Significant pre–post improvements were reported across the intercultural dimensions, together with increased emotional engagement and practical language use.
Cheung and Shi (2024)	Hong Kong; nine undergraduates in a service-learning subject	Qualitative service-learning study	GenAI-supported written and podcast storytelling with asylum-seeking children	Cultural awareness, community engagement, and learner agency; semi-structured interviews and qualitative content analysis	Students reported greater creative and cultural awareness while maintaining control over AI output. GenAI played a supporting rather than central role in story creation.
Zheng and Lei (2024)	College English learners; sample size not clearly reported	Empirical teaching comparison with technical model evaluation	Neural machine translation and GAN-based grammar correction in multimedia instruction	Intercultural communication awareness and language performance; teaching comparison and performance measures	The multimedia-assisted condition produced a 9.8% performance increase compared with 1.9% under traditional teaching and reported positive change in intercultural communication awareness.

Note. AI = artificial intelligence; AR = augmented reality; ASR = automatic speech recognition; BIPA = Indonesian Language for Foreign Speakers; COIL = Collaborative Online International Learning; EFL = English as a Foreign Language; GAN = generative adversarial network; GenAI = generative artificial intelligence; NLP = natural language processing; TTS = text-to-speech; VR = virtual reality. Only findings relevant to the review questions are summarised.