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Culturally Responsive AI Scaffolding in Collaborative Language Education: Exploring Sociocultural Adaptations across Diverse Learning Contexts

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Abstract

The paper aims to review the application of culturally responsive artificial intelligence (AI) scaffolding in language learning and explore how this technology can be adapted to various sociocultural and collaborative learning environments. The key research questions include reviewing how AI tools can be integrated into culturally responsive pedagogy, identifying the most successful practices that support equal participation among all learners, and considering the restrictions and ethical issues associated with their use. It was conducted using a systematic literature review (SLR) approach to ensure a transparent and rigorous methodology. The conducted study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) to select and synthesise the relevant studies. Large databases were used to retrieve twelve peer-reviewed articles from 2020-2024. On screening and evaluation against rigorous inclusion and exclusion criteria, the studies were thematically coded and quality-appraised with the CASP checklist. The results suggest that although the AI scaffolding holds excellent promise as a means of assisting with cognitive, metacognitive, and affective aspects of language acquisition, its cultural flexibility leaves much to be desired. Few studies have explicitly dealt with cultural responsiveness, and the majority of the tools were developed based on standardised or Western-centric frameworks. Participatory design methods, the incorporation of culturally inclusive case studies, and the application of AI to facilitate intercultural dialogue are promising approaches. The findings suggest that more comprehensive AI systems should be trained on multicultural datasets and developed with the input of teachers and students from diverse backgrounds. Ethical issues, including the reduction of bias and fair accessibility to AI technologies in various socio-economic and geographical settings, are also highlighted in the review. The culturally responsive AI scaffolding should be context-aware, inclusive, and co-designed with users to ensure its effectiveness and efficacy. Longitudinal effects and the expanded representation of the Global South should be studied in the future, and policy should be informed by the equitable introduction of AI in education.

Keywords: Culturally Responsive Pedagogy, Artificial Intelligence, Language Learning, Collaborative Learning, Educational Technology.

Introduction

Theoretical and Conceptual Framework

Vygotsky's Sociocultural Theory

Among the fundamental principles of sociocultural theory, as initially designed by Lev Vygotsky, one must mention learning as a process that is socially supported, which can be facilitated by more knowledgeable partners, such as other learners, teachers, or other mediators, and cultural artefacts, including language and technology (Ameri, 2020). Another vital construct in this framework is the Zone of Proximal Development (ZPD), which represents the distance between

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what learners can do independently and what they can do with the help of others. The strategy that acts on the level of ZPD is scaffolding, which enables people to perform activities that are beyond their current competence and capacity to do so independently. The holding of supports accompanies the growth of proficiency, allowing sense learners to increase their sense of self-efficacy (Xu and Long, 2021; Daramola et al., 2024). The ZPD in language learning takes the form of guided interactions, peer cooperation, and teacher mediation. The social interaction then becomes the primary source of internalisation and language development. This is especially relevant in the context of collaborative learning, where knowledge is co-constructed through dialogue, negotiation, and joint meaning-making with peers (Rahmatirad, 2020; Rosborough and Wimmer, 2023). When properly designed, AI systems can act as mediators in this process by providing dynamic scaffolding tailored to the learner's current level of understanding. However, to become functional in heterogeneous classrooms, AI should be able to identify not only cognitive but also cultural and social aspects of interaction between learners.

Culturally Responsive Pedagogy

Culturally Responsive Pedagogy (CRP), as expounded by Abdalla and Moussa (2024), is a teaching approach that suggests instructors should teach based on the premise of the cultural knowledge, prior experiences, and identities of the students. It also opposes deficit views that tend to disempower students whose backgrounds are different or non-dominant, focusing on inclusiveness, relevance, and the acknowledgement of other ways of knowing. Gay identifies several significant principles of CRP, including validating the cultural heritages of students, building cultural competence, and ensuring academic achievement without assimilation (Chang and Viesca, 2022). One of the most critical elements is the identification of learner identity and lived experiences, as it influences how the students approach the material and one another. CRP urges teachers to make learning contextual in a manner that reflects the realities of the students through the use of culturally relevant exemplars, a variety of languages and comfortable forms of communication (Abdalla and Moussa, 2024). Applied to AI systems, these principles require designing learning tools that embody cultural plurality and lack biases, as well as multiple learning pathways.

AI Scaffolding and Collaborative Learning

Educational technology divides scaffolding into information about the learning goals and the steps of assistance that AI systems offer to learners. They can be divided into three kinds: cognitive scaffolding (e.g., hints, examples, adaptive content), metacognitive scaffolding (e.g., reflection prompts, goal setting), and emotional scaffolding (e.g., encouragement, reducing anxiety) (Andersen, Mørch and Litherland, 2022). In language learning, such scaffolds can be implemented in chatbots, intelligent tutoring systems, or speech recognition applications that communicate with the learner in real-time. In the meantime, collaborative learning theories provide insight into how learning occurs within the context of everyday actions. According to Järvelä, Nguyen and Hadwin (2023), collaboration is a synchronised effort that is coordinated to construct and negotiate meaning. Kim, Lee and Cho (2022) build on this by introducing group cognition, in which learning is not only a product of individual minds but also a result of group dynamics. AI can facilitate this process by assisting with shared digital workspaces, role allocation, and providing comments on collective contributions. Such systems should, however,

be culturally sensitive in the sense that they recognise that different cultures have different norms of collaboration, such as the importance attached to individual or group success and the use of direct or indirect communication.

Integrating AI into Culturally Responsive Collaborative Language Learning

AI applications can model, assist, or even impede culturally responsive practices within collaborative learning settings. Intelligent systems could be designed to support various linguistic registers, scaffold learning based on culturally resonant examples, and adapt communication styles to users' preferences. As a specific example, an AI-powered language learning app might allow users to specify culturally familiar scenarios or switch between dialects and formalities, thereby making language acquisition processes more grounded in reality and, consequently, more engaging (Larasati and Ginting, 2024; Elmahdi et al., 2025). Nevertheless, where AI systems are produced with minimal attention to culture or taught biased information, there is a high risk of cultural homogenisation. The chatbot in English conversation can be founded on Anglo-American norms that may not be very encouraging to learners of other cultures. AI tools designed without considering the rules of turn-taking, methods of politeness, or culturally preferred group ownership when used in a collaborative setting risk reinforcing exclusion rather than inclusion (Jafarnia, Hariri, and Parvizi, 2023). Ethics and equity are also considered in the context of AI applications in education. AI algorithm bias can be detrimental to marginalised populations, and the AI decision-making process often lacks the transparency needed to reveal the utilisation of learner data (Mageira et al., 2022; Pitychoutis and Al Rawahi, 2024). Participatory design is one approach to ensuring fairness; developers and educators should involve various stakeholders in the design and testing of AI tools to ensure their effectiveness and impact. Furthermore, they should offer explainability, privacy protection, and personalisation options so that learners are always in control of their learning processes.

Methodology

This paper was discussing the use of culturally responsive AI scaffolding in collaborative language learning through a systematic literature review (SLR). The SLR method is chosen due to its simplicity and the systematic and repetitive nature of the search and synthesis of the available research. A traditional narrative review can be likened to a SLR, whereby the former is opinionated and non-systematic, and the latter is objective and systematic. The second reason is that SLRs are characterised by low investigator bias; the process is limited to several predetermined actions, making the review transparent, thorough, and repeatable. It is primarily applied to multidisciplinary themes that span multiple disciplines, such as artificial intelligence, education, and cultural studies. The proposed study will assist in bridging the gaps in fragmented knowledge and present evidence-based conclusions regarding the necessity of introducing culturally responsive AI-powered tools into the language learning process.

Review Protocol

The systematic review was conducted following the PRISMA model, which provides a detailed procedure for locating, screening, and appraising studies related to the problem. The rationale behind the choice of PRISMA is that it emphasises transparency, thereby enabling other

researchers to recreate and replicate the process. A sophisticated review protocol was formulated prior to data extraction, which included specific search phrases, eligibility criteria, data abstraction forms, and quality appraisal instruments.

Search Strategy

To conduct a comprehensive and interdisciplinary literature search, significant databases were utilised: Scopus, Web of Science, ERIC, IEEE Xplore, and Google Scholar. These databases have been chosen because of their pertinence in education, technology and linguistics. Keyword combinations and Boolean operators were applied to make the search results as sensitive and accurate as possible. The search string consisted of a combination of terms, including AI, scaffolding, language learning, culture, and their associated synonyms, such as artificial intelligence, intelligent tutoring systems, culturally responsive pedagogy, and collaborative learning. To ensure consideration of the latest advancements in the field of AI and education, the search was narrowed down to studies published between 2020 and 2024. Peer-reviewed journal articles and conference papers written in English were only taken into consideration.

Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Peer-reviewed journal articles or conference papers	Editorials, opinion pieces, dissertations, or non-peer-reviewed work
Published between 2020 and 2024	Studies published before 2020
Written in English	Non-English publications
Focus on AI tools in language education	Studies not involving AI or not focused on language learning
Demonstrates collaborative or cultural pedagogical dimension	Studies lacking collaborative or cultural elements

Study Selection Process

The study selection process involved four steps of the PRISMA framework. Duplicate studies were excluded with the help of reference management software after searching the databases. The remaining articles were subject to title and abstract screening, during which the inclusion and exclusion criteria eliminated irrelevant studies. Then, the full texts of the selected articles were read to determine their eligibility. Out of a total of 876 records, 250 studies remained after duplicates were removed and the abstracts were screened. After full-text reading, 12 articles were finally selected for the final synthesis.

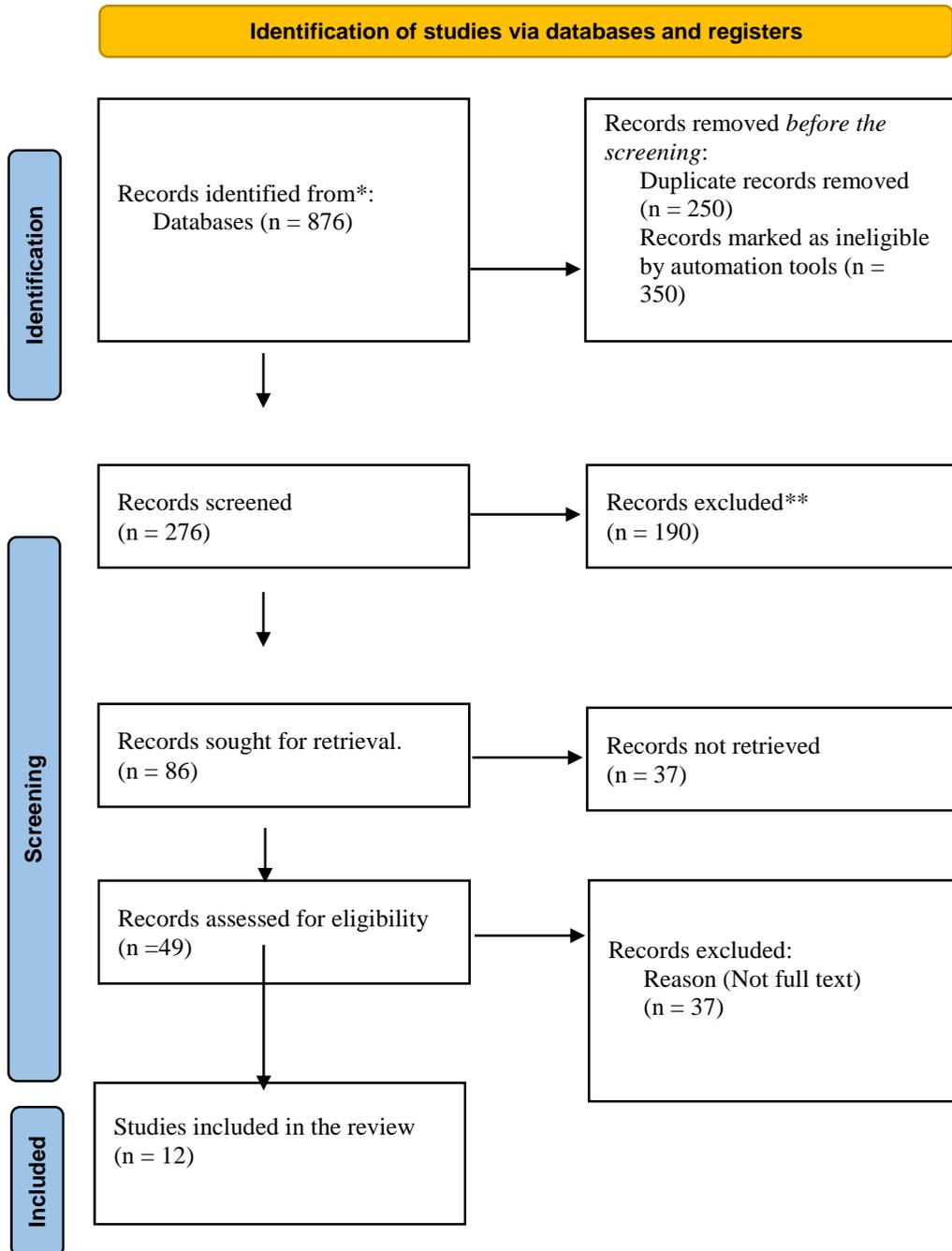


Figure 1: PRISMA

Data Extraction and Synthesis

A coding sheet was used to extract the data corresponding to each included study, including variables like the type of AI tool used, level of education (e.g., K12, higher education), cultural responsiveness, and type of scaffolding applied (cognitive, metacognitive, or emotional), collaborative structures, and reported learner outcomes. The extracted data were analysed within the thematic synthesis approach. Iterative coding and cross-case analysis facilitated the identification of themes. These themes were grouped into categories, namely types of AI scaffolding, cultural responsiveness, collaboration approaches, sociocultural adoptions, learner engagement, and challenges.

Quality Assessment

To achieve methodological rigour, the Critical Appraisal Skills Programme (CASP) checklist was used to appraise all recruited studies. This instrument was chosen because it could assess the quality of qualitative and mixed-methods studies. The studies were evaluated based on criteria such as clear aims, appropriateness of the methodology, rigour of data collection and analysis, ethical considerations, and validity of the conclusions. The studies considered had to meet at least six out of ten CASP criteria, meaning that only well-developed and reliable research was used in the review.

Findings and Thematic Analysis

This section summarises the results of some studies on culturally responsive AI scaffolding in collaborative language learning, extracting common trends, advantages, and limitations. To organise the analysis, six themes are identified based on a review of primary academic sources.

Table 1: Selected Studies Detail

Authors and Year	Focus of Study	Type of AI Scaffolding / Tool	Cultural Responsiveness Aspect	Key Findings
Xia, Shin and Kim (2024)	Cross-Cultural Intelligent Language System (CILS) for language learning	Real-time feedback with multilingual cues	Contextualised feedback aligned with cultural and linguistic norms	Promoted metacognitive strategies; improved language accuracy
Maphoto et al. (2024)	Academic writing support in distance learning	Generative AI for scaffolding writing	Indirect cultural adaptation through flexible writing prompts	Enhanced academic writing skills; improved collaboration
Liu (2025)	Teacher	Assisted	Limited explicit	Increased

	education using AI	correction and AI moderation in peer-review	cultural adaptation; focus on teaching simulation	teaching confidence; improved collaborative discourse
Zhai, Wibowo and Li (2024)	Dialogue-based AI with empathy and humour	Conversational guidance	Adapted conversational style to learner cultural norms	Increased engagement, trust, and speaking confidence
Yousif (2025)	AI-enhanced curriculum using ZPD	Scaffolded guidance at ZPD level	Regional communication style adaptation	Improved learner independence and measurable progress
Wu (2024)	Cultural responsiveness in AI curriculum design	Various AI tools in collaborative learning	Highlights bias toward Western norms; advocates inclusivity	Multilingual resources improved diversity awareness; noted gender participation gaps
Kim, Lee and Cho (2022)	Hybrid L1-L2 scaffolding	Language transfer support	Use of native languages in prompts and explanations	Facilitated linguistic transfer; increased learner involvement
Jayasinghe, Arm and Gamage (2025)	Generative AI for culturally relevant case studies	Case-based AI scaffolding	Culturally framed scenarios and role allocation	Enhanced cohesion, productivity, and intercultural empathy
Alam and Mohanty (2023)	AI for cross-cultural communication	AI-mediated learning	Local sociocultural context integration	Improved cross-cultural understanding
Davis, Bush and Wood (2024)	Adaptation limits in AI	Adaptive AI tools	Identified systemic Western-centric bias	Cultural homogenisation reduced inclusivity

Gyasi, Zheng and Long (2021)	Cross-cultural collaborative learning with AI	Group-based mediation	Mitigation of miscommunication but limited equity programming	AI sometimes reinforced dominant language ideologies
Yang (2022)	AI in young learner education	AI-assisted group work	Lack of culturally sensitive conflict resolution	Missed opportunities for deeper intercultural competence

Theme 1: Types of AI Scaffolding Used

Three forms of AI scaffolding in language learning were broadly defined and encompassed real-time feedback, language correction and dialogue-based guidance. These characteristics were adopted in different formats to facilitate language acquisition. The intelligent tutoring systems focused on real-time feedback systems, i.e. pronunciation correction in real-time or recognition of syntactic errors. Xia, Shin, and Kim (2024) demonstrated that the Cross-Cultural Intelligent Language System (CILS) provided contextualised feedback with multilingual cues, which effectively promoted learners' metacognitive strategies. The importance of adaptive interfaces in language correction was highlighted in Maphoto et al. (2024), where generative AI was used to scaffold academic writing among distance education learners. Likewise, Liu (2025) emphasised the application of AI instruments to teacher education, in which assisted correction enabled pre-service teachers to mirror their teaching. In systems that have been tested, such as the one tested by Zhai, Wibowo, and Li (2024), dialogue-based guidance played an essential role, as it incorporated empathy and humour. Their results highlight that AI dialogue style and content contributed to longer-term engagement and trust between learners, especially those of different cultures. Such scaffolding techniques aided the development of skills; however, not all studies showed a rigorous pedagogical match with Vygotsky's Zone of Proximal Development (ZPD). However, Yousif (2025) directly integrated the ZPD concept into an AI-enhanced curriculum, demonstrating positive changes in learners' independence and progress through measurements.

Theme 2: Cultural Responsiveness in AI Tools

The cultural tuning of the tools played a considerable role in the success of AI scaffolding. Regarding the identity affirmation of learners and the relevance of the curriculum, Wu (2024) emphasised that cultural responsiveness is critical but lamented that the majority of tools are still anchored in Western linguistic norms. This gap was filled with several studies. Kim, Lee and Cho (2022) introduced the native languages of learners in prompts and explanations in a hybrid model, in which language scaffolds were transferred between L1 and L2. This strategy facilitated more linguistic transfer and involvement. Cultural preferences and adaptive interfaces were also investigated. Jayasinghe, Arm and Gamage (2025) used generative AI to generate case studies within students' cultural frame of reference. AI-assisted learning enhanced cross-cultural communication and understanding among students by presenting situations based on local

sociocultural contexts (Alam and Mohanty, 2023). Additionally, a reflection of a variety of linguistic customs, such as regional dialects or sociolects, proved to be a common theme. Zhai, Wibowo, and Li (2024) have found that learners are more responsive to AI avatars when conversation nuances are based on their personal cultural and communicative standards. However, Davis, Bush, and Wood (2024) observed that there was no systemic progress in this direction, which they attributed to training data bias and algorithmic generalisation.

Theme 3: Collaborative Learning Structures

The consulted literature emphasised that collaborative learning when supported by AI, yields a specific dividend in multilingual environments. Such advantages were especially tangible in group-based AI mediation, peer-to-peer AI support, and multicultural group dynamics. A prominent example of AI-mediated group discussions was conducted by Liu (2025), who utilised ChatGPT as a moderator in peer-review meetings. The AI intervened in critical situations by providing neutral feedback, prompting thinkers to consider diverse interpretations of the information and, thereby, improving the quality of the discourse. Maphoto et al. (2024) explored peer-to-peer support with AI assistance. They reported the positive effect on the academic writing of distance learners when AI-mediated commentary and collaborative editing activities were introduced. The AI took the role of a dialogic partner and mentor, which enhanced collaborative processes. Gyasi, Zheng, and Long (2021) investigated multicultural group dynamics and explored how AI might mitigate cross-cultural miscommunication. They, however, warned that AI tools, when not programmed with equity in mind, occasionally enforced ideologies of dominant languages. This has been established by Zhai, Wibowo, and Li (2024), who noted that in many cases, English-dominant models have found it challenging to address power imbalances between native and non-native speakers in mixed groups. Critically, although AI-assisted teamwork is promising, the lack of culturally sensitive conflict resolution systems is a design shortcoming (Yang, 2022). The tools also lacked the sensitivity needed to navigate some culturally sensitive matters and, therefore, did not provide an opportunity to develop a deeper intercultural competence.

Theme 4: Sociocultural Adaptations

Customising AI to those social parameters is crucial to its success in various learning settings. Yousif (2025) provided an example of how AI can tailor its prompts to student-preferred communication styles, either direct questioning or indirect suggestion, based on regional cultural code preferences. Gender roles and classroom behaviours were also recognised. According to Wu (2024), female students participated less in open discussion forums related to AI in some settings (conservative educational systems). The use of AI interfaces, which allowed for anonymous interaction, helped decrease anxiety and increase participation. A key issue in addressing power dynamics in collaborative work was examined by Jayasinghe, Arm, and Gamage (2025), who concluded that, due to AI's suggested fair allocation of roles for each member in a case-based task, group cohesion and productivity were enhanced. However, they also noticed that unadapted AI systems reinforced stereotypes in some cases, particularly when case studies were created using biased training sets. Regardless of these examples, not many systems practised ongoing cultural calibration, and this is an indication of a disconnect between intention and action. Responsiveness, as Wu (2024) cautioned, cannot be a fixed aspect; rather,

it is a continuous dialogue between system design, user response, and cultural change.

Theme 5: Learner Outcomes

It was found that AI-based scaffolding has a positive influence on various learner outcomes, especially in language learning, motivation, and cultural awareness. Most research has shown improvements in language acquisition, particularly in terms of syntactic complexity and vocabulary diversity (Xia, Shin, and Kim, 2024; Liu, 2025; Kim, Lee, and Cho, 2022). The systems that were rich in feedback helped learners internalise the grammatical patterns by requiring repetition and practice (Yang, 2022). The highest levels of engagement and motivation were recorded in the environments where learners believed that the AI was culturally and linguistically relatable. The study by Zhai, Wibowo, and Li (2024) found that empathic and humorous AI dialogue systems had a positive effect on boosting learners' confidence and reducing anxiety during speaking activities. The effectiveness of teamwork and cultural awareness increased when groups utilised culturally based materials. Higher scores related to intercultural empathy were reported by Jayasinghe, Arm, and Gamage (2025) among students who had been exposed to AI-generated, localised case studies. Similar findings were reported by Wu (2024), who stated that exposure to multilingual resources and AI enhances the understanding of linguistic diversity. However, longer-term studies queried lasting effects. Gyasi, Zheng, and Long (2021) observed that, although AI tools initially sparked interest, further sociocultural competence required continuous guidance from human instructors. This implies that AI scaffolds should not be viewed as standalone solutions but rather as part of a combination with reflective pedagogies.

Theme 6: Challenges and Limitations

Several shortcomings were identified that hinder the full implementation of culturally responsive AI in language learning. Excessive use of Western data is a fundamental problem. The homogenisation of AI responses was decried by Davis, Bush and Wood (2024), who complained that numerous systems reverted to American English cultural references. Not only did this marginalise non-Western learners, but it also reinforced a very idealised view of the world when it came to teaching languages. Another issue was the absence of multilingual NLP models. Most commercial AI systems continue to perform poorly on low-resource languages, even in cases where Xia, Shin, and Kim (2024) and Wu (2024) attempted to integrate multilingual models. This impedes fair access and threatens to naturalise linguistic hierarchies. Alam and Mohanty (2023) highlighted privacy and ethical risks associated with personalisation and raised concerns about the transparency of data collection practices. Personalised AI scaffolding regularly necessitates considerable learner profiling, which raises concerns about consent and information sovereignty, particularly in cross-national educational contexts. In addition, the variable of teacher preparedness had been ignored. Liu (2025) found that without AI literacy education, teachers were unlikely to employ these instruments productively and ethically. Without essential frames of critical digital pedagogy, there can be no substantial introduction of AI in culturally responsive teaching.

Discussion

The results of the thematic analysis reveal a nuanced understanding of the functioning of AI-powered scaffolding in culturally diverse collaborative language education settings. An important lesson here is that, although numerous AI-based technologies have been effectively implemented to support language learning, including chatbots, intelligent tutoring systems, and adaptive platforms, to name a few, to promote learning in real-time by providing feedback and language correction and facilitating interaction through dialogue, the tools are not evenly distributed about culturally responsive frameworks. Other systems are designed to purposefully integrate the cultural background and first languages of learners into their scaffolding capabilities (e.g., the Cross-Cultural Intelligent Language Learning System, or CILS) (Xia, Shin and Kim, 2024). The rest, nevertheless, are dependent on Western-centric data and design assumptions and are ultimately restricted in cultural flexibility (Wu, 2024; Davis, Bush and Wood, 2024).

However, culturally responsive AI scaffolding should support various learners, including those with different instructional, content, and interaction styles, based on their sociocultural identities. In the contemporary scene, there are encouraging minor developments. For instance, Zhai, Wibowo, and Li (2024) demonstrated that an AI dialogue system, which incorporated intercultural humour and empathy, increased engagement among English language learners, particularly in multicultural classroom environments. However, such a subtle integration of cultures is rather the exception than the rule. Most tools are currently unable to offer culturally adaptive interaction mechanisms; in most cases, this is due to insufficient diversity in training data or the lack of developed design frameworks (Jayasinghe, Arm, and Gamage, 2025). Furthermore, instruments that incorporate native language or culturally specific material often achieve this in a superficial manner, which is not profound enough to foster a profound cultural connotation.

Pedagogically, the findings emphasise the importance of re-conceptualising collaborative AI activities beyond being functional to being culturally situated. Cooperative language learning facilitated by AI has already demonstrated its potential to support peer-to-peer interactions and culturally diverse groups (Gyasi, Zheng, and Long, 2021; Andersen, Mørch, and Litherland, 2022). Yet, it involves educators being active in regulating AI-assisted activities about the identities of learners. It is also necessary to provide teachers with adequate AI literacy to handle such integrations (Liu, 2025), as well as to promote reflections on both the linguistic and cultural aspects. This would involve moving beyond a universal design of activities to a pluralistic, situated pedagogy in which AI assisted not only linguistic skills but also intercultural dialogue and collaborative negotiation.

The potential of AI to promote inclusivity through a collaborative framework also looks bright. Other researchers have noted that AI-based technology can support group-based discussions and contribute to equal participation, even in cases where students belong to diverse linguistic and cultural groups (Yang, 2022; Mageira et al., 2022). Such systems can act as impartial mediators, facilitating turn-taking and ensuring voice equity. Nevertheless, it is equally important to note that AI-mediated collaboration risks unintentionally introducing and reinforcing social hierarchies unless the systems are designed to be sensitive to power relations, gender identities, and sociolinguistic hierarchies prevalent in numerous classrooms (Alam and Mohanty, 2023). As

a non-exhaustive example, when the AI does not recognise or adjust to indirect communication patterns that are used in certain cultures, it can fail to interpret the intentions of learners or punish their answers (Jafarnia, Hariri and Parvizi, 2023). Therefore, scaffolding should be critically sensitive not only to the forms of language but also to how learners convey meaning in a culturally and socially meaningful manner.

The culturally responsive AI goes beyond superficial localisation. It needs the inclusion of sociocultural theory in the very structure of AI systems (Ameri, 2020). It involves, among other things, diversifying training datasets to represent a broader range of cultural, linguistic, and interactional norms (Chang and Viesca, 2022; Godwin-Jones, 2024). The creators of AI need to integrate the findings of culturally responsive teaching frameworks (Abdalla and Moussa, 2024), sociolinguistics, and intercultural communication to enhance the effectiveness of AI systems. An exemplary practice observed in some studies was engaging learners as cultural informants in the development process. As one such example, Björling et al. (2021) involved English language learners in the co-design of a social robot, resulting in higher user satisfaction and cultural applicability of the tool. Such a participatory method not only makes the tool more capable but also makes it more ethically aligned with the realities in which learners live.

A second implication of great significance to design is that iterative, context-aware testing is required. Before widespread implementation, systems ought to be tested in diverse environments, including urban, rural, Global North, and Global South settings. Nevertheless, the literature reviewed indicates an excess of studies in technologically developed environments and a limited amount of investigation in low-resource contexts, especially those in the Global South (Wu, 2024; Gyasi, Zheng, and Long, 2021). This restricts generalisability and raises issues of equity, where learners in less favourable contexts may receive tools that are ill-suited to their educational and cultural needs. Additionally, in culturally sensitive designs, AI tools will still need to address ethical issues, particularly those related to bias prevention and user privacy (Yousif, 2025). These systems can easily promote stereotypes or unwarranted assumptions concerning the cultural identity of the learners without keen data governance.

Policy-wise, more inclusive AI funding models and research prioritisation are needed to address these concerns. Governments and international organisations must encourage cross-cultural AI development by investing in multilingual natural language processing (NLP) and promoting open access to culturally diverse data, as well as facilitating collaboration among educational researchers, technologists, and local communities. Furthermore, policies must be designed to ensure that AI systems in classrooms are tested on cultural fairness, in addition to instructional efficiency (Jarvela, Nguyen, and Hadwin, 2023; Anis, 2023). Nevertheless, although the idea of culturally responsive AI sounds promising, a few drawbacks of the existing literature cool the ardour. Firstly, the studies reviewed are not longitudinal in scope. Although short-term language improvements and learner satisfaction are extensively reported, the long-term impacts of AI-assisted, culturally responsive scaffolding on language proficiency, intercultural competence, and social learning have received little attention (Kim, Lee and Cho, 2022). A special role, in this case, belongs to longitudinal research, which may help determine how the cultural identity of learners changes in AI-based conditions and whether such systems can maintain interest over a long period (Larasati and Ginting, 2024). Also, the scarcity of attention paid to the Global South settings compromises the inclusivity of this educational paradigm.

Conclusion

In conclusion, this systematic literature review critically evaluated the use of culturally responsive scaffolding in AI-mediated collaborative language learning, highlighting its potential and the limitations it still faces in its current capacity. Although AI technologies, intelligent tutoring systems, and dialogue-based platforms have significant potential to encourage linguistic interaction and promote peer collaboration, they are not equally effective across cultures and tend to stay at a superficial level. Current practices of introducing native speech or cultural identifiers are locally confined, leaving much ground to be covered regarding social and cultural contexts of diverse learning groups as a whole. One of the implications of this review is that AI scaffolding must be integrated with culturally responsive pedagogical paradigms that embrace the sociocultural identities, communication norms, and relevant experiences of learners. The results emphasise applicable design criteria, such as situation of group work, support for multifaceted training data, encouragement of joint reflection, and strong participation of students and teachers in co-designing efforts.

Moreover, the review emphasises the necessity of AI literacy for teachers to make sure that the introduction of technologies will not contradict but enhance culturally predetermined ways of communication. Essential gaps in research were noted, particularly the limited number of longitudinal studies examining the long-term effects of language proficiency and intercultural competence, as well as the underrepresentation of Global South experiences in empirical research. These gaps will need to be addressed through targeted research agendas, inclusive design programs, and equitable access to resources. Learner-centred and participatory approaches to future development should be based on educators and students as co-creators, ensuring contextual relevance. Cultural equity, transparency, and accessibility should be the top priorities for corporations when implementing policy frameworks that can accommodate AI as an inclusive and collaborative learning facilitator.

References

- Abdalla, H. and Moussa, A., 2024. Culturally responsive teaching: Navigating models and implementing effective strategies. *Acta Pedagogica Asiana*, 3(2), pp.91-100.
- Alam, A. and Mohanty, A., 2023. Educational technology: Exploring the convergence of technology and pedagogy through mobility, interactivity, AI, and learning tools. *Cogent Engineering*, 10(2), p.2283282.
- Ameri, M., 2020. Criticism of the sociocultural theory. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)*, 3(3), pp.1530-1540.
- Andersen, R., Mørch, A.I. and Litherland, K.T., 2022. Collaborative learning with block-based programming: investigating human-centred artificial intelligence in education. *Behaviour & Information Technology*, 41(9), pp.1830-1847.
- Anis, M., 2023. Leveraging artificial intelligence for inclusive English language teaching: Strategies and implications for learner diversity. *Journal of Multidisciplinary Educational Research*, 12(6), pp.54-70.
- Björling, E.A., Louie, B., Wiesmann, P. and Kuo, A.C., 2021. Engaging English language learners as cultural informants in the design of a social robot for education. *Multimodal Technologies and Interaction*, 5(7), p.35.
- Chang, W.C. and Viesca, K.M., 2022. Preparing teachers for culturally responsive/relevant pedagogy (CRP): A critical review of research. *Teachers College Record*, 124(2), pp.197-224.
- Daramola, M.A., Okunade, A.I., Jegede, R.O. and Okeya, A.E., 2024. A critical evaluation of the

- Vygotsky's socio-cultural theory as evident within an aspect (s) of curriculum, pedagogy and/or assessment in Nigeria. *TWIST*, 19(2), pp.583-588.
- Davis, C., Bush, T. and Wood, S., 2024. Artificial intelligence in education: Enhancing learning experiences through personalised adaptation. *International Journal of Cyber and IT Service Management*, 4(1), pp.26-32.
- Elmahdi, O.E.H., AbdAlgane, M., Hamid, F.A., Balla, A.A.S. and Ibrahim, I.Z.A., 2025. Integrating Critical Thinking and Technology in Saudi EFL Classrooms: A Framework for Culturally Responsive Language Learning. *International Journal of English Language Studies*, 7(2), pp.34-52.
- Godwin-Jones, R., 2024. Distributed agency in second language learning and teaching through generative AI. arXiv preprint arXiv:2403.20216.
- Gyasi, J.F., Zheng, L. and Long, M., 2021. Reflecting on the past to shape the future: a systematic review on cross-cultural collaborative learning from 2011 to 2020. *Sustainability*, 13(24), p.13890.
- Jafarnia, A., Hariri, H. and Parvizi, G.R., 2023. Unlocking the Potential: Exploring the Multifaceted Impact of Artificial Intelligence Integration in Language Learning. *Language Education and Technology*, 3(2).
- Järvelä, S., Nguyen, A. and Hadwin, A., 2023. Human and Artificial Intelligence Collaboration for Socially Shared Regulation in Learning. *British Journal of Educational Technology*, 54(5), pp.1057-1076.
- Jayasinghe, S., Arm, K. and Gamage, K.A., 2025. Designing Culturally Inclusive Case Studies with Generative AI: Strategies and Considerations. *Education Sciences*, 15(6), p.645.
- Kim, J., Lee, H. and Cho, Y.H., 2022. Learning design to support student-AI collaboration: Perspectives of leading teachers for AI in education. *Education and information technologies*, 27(5), pp.6069-6104.
- Larasati, A. and Ginting, P., 2024. Culturally Responsive Teaching Integrated Skill AI Based Learning Applicator to Elevate Learners Critical Thinking and Writing Proficiency. *IDEAS: Journal on English Language Teaching and Learning, Linguistics and Literature*, 12(1), pp.396-416.
- Liu, W., 2025. Language teacher AI literacy: insights from collaborations with ChatGPT. *Journal of China Computer-Assisted Language Learning*, (0).
- Mageira, K., Pittou, D., Papsalouros, A., Kotis, K., Zangogianni, P. and Daradoumis, A., 2022. Educational AI chatbots for content and language-integrated learning. *Applied Sciences*, 12(7), p.3239.
- Maphoto, K.B., Sevnarayan, K., Mohale, N.E., Suliman, Z., Ntsopi, T.J. and Mokoena, D., 2024. Advancing students' academic excellence in distance education: Exploring the potential of generative AI integration to improve academic writing skills. *Open Praxis*, 16(2), pp.142-159.
- Ober, T.M., Lehman, B.A., Gooch, R., Oluwalana, O., Solyst, J., Phelps, G. and Hamilton, L.S., 2023. Culturally responsive personalised learning: Recommendations for a working definition and framework. *ETS Research Report Series*, 2023(1), pp.1-14.
- Pawan, F., Li, B., Dopwell, M.B., Nijiati, S., Harris, A. and Iruoje, T., 2023. Culturally and Linguistically Responsive Online Teacher Learning and Professional Development. *Online Learning*, 27(4), pp.171-200.
- Pitychoutis, K.M. and Al Rawahi, A., 2024. Smart teaching: The synergy of multiple intelligences and artificial intelligence in English as a foreign language instruction. In *Forum for Linguistic Studies* (Vol. 6, No. 6, pp. 249-260).
- Rahmatirad, M., 2020. A review of socio-cultural theory. *Siasat*, 5(3), pp.23-31.
- Rosborough, A. and Wimmer, J., 2023. Vygotskian sociocultural theory for second language learners: Addressing in/commensurabilities with popular school-based curricula. *Journal of Applied Linguistics and Applied Literature: Dynamics and Advances*, 11(2), pp.183-204.
- Salas-Pilco, S.Z., Xiao, K. and Oshima, J., 2022. Artificial intelligence and new technologies in inclusive education for minority students: A systematic review. *Sustainability*, 14(20), p.13572.
- Wu, Y., 2024. Revolutionising Learning and Teaching: Crafting Personalised, Culturally Responsive

- Curriculum in the AI Era. *Creative Education*, 15(8), pp.1642-1651.
- Xia, Y., Shin, S.Y. and Kim, J.C., 2024. Cross-cultural intelligent language learning system (CILS): Leveraging AI to facilitate language learning strategies in cross-cultural communication. *Applied Sciences*, 14(13), p.5651.
- Xu, J. and Long, Z., 2021. Sociocultural Theory and L2 Learning. *Language and Sociocultural Theory*, 7(2), pp.202-222.
- Yang, W., 2022. Artificial Intelligence education for young children: Why, what, and how in curriculum design and implementation. *Computers and Education: Artificial Intelligence*, 3, p.100061.
- Yousif, J.H., 2025. Artificial Intelligence Revolution for Enhancing Modern Education Using Zone of Proximal Development Approach. *Applied Computing Journal*, pp.386-398.
- Zhai, C., Wibowo, S. and Li, L.D., 2024. Evaluating the AI dialogue System's intercultural, humorous, and empathetic dimensions in English language learning: A case study. *Computers and Education: Artificial Intelligence*, 7, p.100262.