International Journal of Sociologies and Anthropologies Science Reviews
Volume 6 Issue 1: January-February 2026: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

Artificial Intelligence in EFL/ESL Education: Transforming Language Learning and Teaching through Adaptive Technology and Ethical Innovation

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Received 03/01/2026 Revised 14/01/2026 Accepted 03/02/2026

Abstract

Background and Aims: The rapid integration of artificial intelligence (AI) into English as a Foreign Language (EFL) and English as a Second Language (ESL) training has resulted in significant pedagogical advancements as well as challenging ethical and instructional challenges. AI-driven tools such as chatbots, automated assessments, adaptive learning systems, and speech recognition technologies are gradually changing language teaching and learning practices worldwide. This study aims to critically examine the pedagogical roles, benefits, and ethical implications of AI-assisted technology in EFL/ESL instruction, with an emphasis on personalization, linguistic diversity, teacher authority, and responsible application.

Methodology: This study systematically examines recent peer-reviewed literature based on computer-assisted language learning (CALL), second language acquisition (SLA), and sociocultural theory using a critical narrative review and conceptual synthesis technique. Instead of producing new empirical data, the research finds recurrent patterns, conceptual conflicts, and unresolved issues in AI-supported language instruction.

Results: The review claims that AI technologies enhance personalized learning, learner engagement, and feedback efficacy. However, there are significant problems with the digital divide, teacher preparedness, data privacy, algorithmic bias, and language standards. The study's response to these issues is a Human-Centered AI–EFL Pedagogy Model, which sees AI as a mediating instructional agent operating under continuous human supervision and ethical regulation.

Conclusion: The results imply that the instructional effectiveness of AI in EFL/ESL contexts depends more on pedagogically informed and morally grounded integration than on technological competence. This study offers a theoretically grounded and policy-relevant viewpoint that highlights linguistic diversity, socio-cultural sensitivity, and continued teacher authority in AI-enhanced language instruction by framing AI as a supportive rather than substitutive force.

Keywords: Artificial Intelligence; ESL; EFL; Language Learning; Educational Technology

Introduction

The integration of artificial intelligence (AI) in English as a Foreign Language (EFL) and English as a Second Language (ESL) education is reshaping traditional teaching and learning methods. AI-driven tools—such as chatbots, adaptive learning platforms, speech recognition systems, and automated assessment technologies—have introduced personalized instruction, real-time feedback, and immersive learning experiences, enhancing pedagogical effectiveness (Arahbi & Khalil, 2023; Jawaid et al., 2025; Li et al, 2025). These advancements align with the growing global demand for English proficiency in academic, professional, and social contexts (Chiu et al., 2023; Du & Daniel, 2024; Hossain & Al Younus, 2025). As AI technology continues to evolve, its role in language acquisition is becoming increasingly prominent, fostering adaptive learning environments that cater to diverse learner needs (Alsaedi, 2024; Halkiopoulos & Gkintoni, 2024).

However, while AI offers transformative potential, its integration into EFL/ESL education raises critical pedagogical and ethical concerns. Algorithmic bias, data privacy risks, and unequal access to AI resources pose significant challenges that, if unaddressed, could reinforce existing educational inequities rather than mitigate them (Crompton et al., 2024; Nadeem et al., 2025). AI models trained on biased datasets may produce skewed language instruction, disadvantaging certain learner groups (Hossain & Al Younus, 2025; Mohammad Ali, 2023). Additionally, AI-powered platforms necessitate robust data security measures to protect students' personal information (Mennella et al., 2024; Soon et al., 2024), while

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disparities in technological access may exacerbate the digital divide, limiting opportunities for underprivileged learners (Jawaid et al., 2025; Johnson & Davis, 2024; Yuan, 2023).

This paper argues that AI has the potential to transform EFL/ESL education by fostering adaptive, data-driven instruction, but its successful integration requires ethical safeguards and pedagogical innovation. Grounded in the frameworks of Computer-Assisted Language Learning (CALL) and Sociocultural Theory, this study critically examines how AI aligns with second language acquisition (SLA) principles and explores unresolved tensions in AI-driven pedagogy. Specifically, it assesses the extent to which AI supports different learner proficiency levels, the balance between AI automation and human instruction, and the policies needed to ensure fair and responsible AI adoption in language education.

By engaging in a comparative analysis of competing perspectives—proponents who advocate for AI-enhanced personalization versus critics who warn of its overuse and ethical pitfalls—this paper moves beyond a descriptive overview to a critical evaluation of AI's strengths and limitations. Additionally, it provides policy recommendations and pedagogical strategies for educators and policymakers, ensuring that AI implementation enhances inclusivity, equity, and teaching effectiveness. This research contributes to the broader discourse on AI in language education, offering insights into how adaptive technology can be ethically and effectively integrated into EFL/ESL instruction.

Methodology

This study adopts a critical narrative review with a conceptual synthesis approach to examine the role of Artificial Intelligence (AI) in English as a Foreign Language (EFL) and English as a Second Language (ESL) education. Rather than conducting an empirical investigation, the paper aims to critically analyze, synthesize, and reinterpret existing scholarly work to identify unresolved tensions, conceptual gaps, and emerging directions in AI-assisted language education.

1. Literature Search Strategy

Relevant literature was identified through a systematic search of major academic databases, including Scopus, Web of Science, ERIC, Google Scholar, and IEEE Xplore. Keywords and Boolean combinations included *"Artificial Intelligence AND EFL," "AI AND ESL education," "AI in language learning," "chatbots AND language education," "automated assessment AND EFL,"* and *"ethical issues of AI in education."* Peer-reviewed journal articles published primarily between 2020 and 2025 were prioritized to ensure conceptual relevance and currency.

2. Inclusion and Exclusion Criteria

Studies were included if they:

1. Focused explicitly on AI applications in EFL or ESL contexts,
2. Addressed pedagogical, theoretical, or ethical dimensions of AI in language education, and
3. Were published in peer-reviewed academic journals.

Studies were excluded if they:

1. Focused solely on technical AI development without educational relevance,
2. Addressed general educational AI without language-learning implications, or
3. Lacked sufficient methodological or theoretical clarity.

4. Analytical Framework and Synthesis Process

The selected literature was analyzed thematically using a theory-informed analytical lens, drawing on Computer-Assisted Language Learning (CALL), Second Language Acquisition (SLA), and Sociocultural Theory. Through iterative comparison and cross-analysis, recurring patterns, contradictions, and underexplored tensions were identified. Rather than merely summarizing prior findings, this study reconstructs existing knowledge into a conceptual synthesis, highlighting how AI simultaneously enhances personalization while risking linguistic homogenization, ethical opacity, and pedagogical dependency.

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The outcomes of this process inform the conceptual framework, critical arguments, and policy-oriented recommendations presented in subsequent sections. Accordingly, the "findings" of this paper should be understood as analytical insights derived from systematic synthesis, not as results from original empirical data collection.

AI in Language Learning: An Overview

The integration of Artificial Intelligence (AI) into language learning has significantly transformed traditional pedagogical methods, shifting towards more adaptive, interactive, and personalized approaches. AI-powered tools address the complexities of language acquisition by offering real-time assistance and feedback while presenting the target language in diverse contexts. While AI-driven applications have improved language learning efficiency, their effectiveness depends on ethical and pedagogical considerations, particularly in addressing issues such as learner autonomy, teacher roles, and the digital divide. This paper critically assesses the strengths and limitations of AI in language learning, advocating for a balanced integration that combines AI-driven innovations with traditional instructional methods.

1. Conceptual and Theoretical Framework

AI-assisted language learning aligns with Computer-Assisted Language Learning (CALL) and key Second Language Acquisition (SLA) theories. CALL highlights technology's role in language learning, evolving from behaviorist drills to interactive and adaptive learning environments (Chapelle, 2003). AI-driven tools, such as chatbots and adaptive platforms, fit within this paradigm by offering personalized feedback, speech recognition, and automated assessment.

From an SLA perspective, Sociocultural Theory (Vygotsky, 1978) emphasizes interaction and scaffolding in learning. AI can serve as a supportive tool, providing structured feedback and adaptive learning experiences, though it lacks the human emotional intelligence necessary for nuanced communication. Similarly, Krashen's Input Hypothesis (1985) suggests that exposure to comprehensible input at a slightly advanced level (i+1) fosters acquisition. AI systems personalize content delivery to match learners' proficiency, yet their ability to provide truly meaningful, contextualized interaction remains debatable.

While AI supports established SLA principles, it also raises critical questions about learner autonomy, cognitive load, and the balance between automation and human interaction. A deeper examination of these dynamics is necessary to ensure AI's pedagogical effectiveness in ESL/EFL contexts.

2. Adaptive Learning Systems

Adaptive learning systems leverage AI-driven algorithms to tailor instruction according to learners' progress, strengths, and weaknesses. Technologies such as Duolingo, Rosetta Stone, and Mondly apply machine learning mechanisms to modify lesson difficulty, ensuring that learners receive content suited to their proficiency levels (Alharbi & Khalil, 2023; Halkiopoulos & Gkintoni, 2024). These systems employ techniques like error analysis, predictive modeling, and spaced repetition to reinforce areas where learners need improvement.

Gamification is a fundamental aspect of adaptive learning systems, increasing motivation and engagement. For example, Duolingo's reward-based approach enhances persistence, whereas Rosetta Stone focuses on immersive, contextual learning (Li et al., 2024). However, while these platforms effectively promote engagement, critics argue that excessive reliance on gamification may lead to superficial learning rather than deep language acquisition (Nadeem et al., 2025). Additionally, adaptive learning systems may not fully accommodate diverse learner needs, particularly those requiring human interaction for nuanced feedback and cultural competency development. Table 1 shows some of the core features of gamification observed in AI-based language learning systems.

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Table 1. *Gamification Elements in AI-Powered Language Learning*

Gamification Element	Description	Examples
Points & Rewards	Learners earn points for completing tasks, boosting motivation.	Duolingo XP, Rosetta Stone progress badges
Leaderboards	Users compete with others, fostering engagement.	Duolingo weekly ranking, Mondly leaderboard
Streaks	Encourages consistency by tracking consecutive learning days.	Duolingo Streak, Busuu daily challenge
Adaptive Challenges	AI adjusts task difficulty to keep learners engaged.	Mondly AI-generated quizzes, Babbel adaptive exercises

3. Critical Evaluation of Automated Assessment Tools

AI-driven assessment tools provide immediate feedback for writing and speaking tasks, reducing reliance on human grading and enabling self-directed learning. Tools such as Grammarly, Write & Improve, and ETS e-rater analyze grammar, coherence, fluency, and stylistic features (Alsaedi, 2024; Hossain & Al Younus, 2025). Similarly, AI-based speech assessment tools, including SpeechAce and IBM Watson Speech to Text, offer pronunciation analysis and fluency evaluations (Alshumaimeri & Alshememry, 2023; Baskara, 2025).

However, while automated assessment tools improve efficiency, they are not without limitations. Natural Language Processing (NLP) based evaluations may struggle with nuanced language use, idiomatic expressions, and cultural variations (Jawaid et al., 2025). Additionally, concerns regarding data privacy and algorithmic bias must be addressed to ensure that AI-generated feedback is equitable and reliable (Yuan, 2023). Further research is needed to assess whether these tools disproportionately favor certain linguistic structures over others, potentially disadvantaging learners from diverse language backgrounds.

4. AI Chatbots & Virtual Tutors: A Pedagogical Debate

AI chatbots and virtual tutors offer real-time conversational practice, enabling learners to improve fluency and vocabulary in a low-pressure environment (Koç & Savaş, 2025; Laksanasut, 2024). Platforms such as ChatGPT, Andy English Bot, and Replika AI simulate human-like dialogue, providing corrective feedback and personalized learning experiences (Alharbi & Khalil, 2023; Xiao et al., 2025).

Despite their advantages, chatbots raise pedagogical concerns. While they enhance accessibility, they cannot fully replicate the complexity of human interaction, particularly in terms of cultural pragmatics and socio-linguistic nuances (Mohammad Ali, 2023). Furthermore, overreliance on AI-mediated communication may diminish opportunities for real-world language practice. Therefore, these tools should complement, rather than replace, traditional conversational learning methods.

5. Speech Recognition & Pronunciation Tools: Balancing Technology with Human Input

Speech recognition tools such as ELSA Speak, Speechling, and Google's Pronunciation Tool analyze pronunciation accuracy and fluency, providing tailored feedback (Baskara, 2025; Du & Daniel, 2024). These tools employ deep learning to detect phonetic discrepancies, stress patterns, and intonation variations, assisting learners in refining their articulation (Sardi et al., 2025; Soon et al., 2024).

While speech recognition technology has demonstrated efficacy in pronunciation training, it also presents challenges. AI-based pronunciation assessments often prioritize standardized accents, potentially marginalizing regional variations and non-native speech patterns (Kim, 2024; Laksanasut, 2024). Furthermore, these tools may lack contextual awareness, misinterpreting intended speech in diverse linguistic settings. Thus, integrating AI speech tools with instructor-led feedback is crucial to ensuring balanced language development.

To summarize the main uses of artificial intelligence in the field of language learning, Table 2 provides an overview of its main functions, benefits, and commonly used tools. The table is a quick

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reference for teachers and students alike who are looking to integrate AI-based solutions into their language learning process.

Table 2. *AI in Language Learning: An Overview*

Category	Description	Examples
Adaptive Learning Systems	AI algorithms tailor instruction based on learner progress, strengths, and weaknesses. Uses spaced repetition, error analysis, and predictive modeling.	Duolingo (gamification, adaptive difficulty), Rosetta Stone (immersive learning), Mondly (speech recognition & AI-driven lessons)
Automated Assessment Tools	AI-powered tools provide real-time feedback on writing and speaking, reducing manual grading and enhancing self-correction.	Grammarly (grammar & style feedback), Write & Improve (CEFR-based writing assessment), SpeechAce (pronunciation analysis)
AI Chatbots & Virtual Tutors	AI-driven chatbots engage learners in real-time conversations, helping with vocabulary, grammar, and fluency in a low-pressure setting.	ChatGPT (conversational AI for varied contexts), Andy English Bot (ESL-focused interactive drills), Replika AI (casual conversation practice)
Speech Recognition & Pronunciation Tools	AI analyzes pronunciation accuracy, stress, intonation, and rhythm, offering targeted exercises to improve articulation.	ELSA Speak (phonetic breakdown & correction), Speechling (record & compare with native speakers), Google Pronunciation Tool (speech analysis & improvement suggestions)

To maximize the benefits of AI in language learning, policymakers and educators must consider regulatory and ethical implications. Key recommendations include: (1) Equitable Access: Addressing the digital divide by ensuring AI-driven language learning tools are accessible to learners from diverse socio-economic backgrounds, (2) Data Privacy Protections: Implementing transparent data collection policies to safeguard learner information, (3) Teacher Training & Integration: Developing professional training programs to help educators effectively integrate AI tools into curricula while maintaining pedagogical oversight, and (4) Balanced AI Implementation: Encouraging a hybrid model where AI complements, rather than replaces, human instruction, preserving critical aspects of language acquisition such as cultural literacy and social interaction.

AI has revolutionized language learning by enhancing personalization, automating assessments, and providing interactive conversational opportunities. However, its integration must be critically assessed to ensure it aligns with pedagogical best practices and ethical considerations. Future research should explore the long-term impact of AI-driven learning on linguistic proficiency, teacher-student dynamics, and policy frameworks. By striking a balance between technological innovation and human-centered instruction, AI can serve as a powerful tool in language education while preserving the fundamental principles of effective language acquisition.

6. A Conceptual Framework: The Human-Centered AI–EFL Pedagogy Model

While existing studies frequently align AI tools with established CALL and SLA theories, fewer attempts have been made to conceptualize how AI should be pedagogically positioned within EFL/ESL classrooms to avoid ethical and instructional imbalance. In response, this paper proposes the Human-Centered AI–EFL Pedagogy Model, which conceptualizes AI not as an autonomous instructor but as a mediating pedagogical agent operating under continuous human oversight.

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This model is structured around three interdependent dimensions:

1. **Adaptive Intelligence** – AI supports personalization, formative assessment, and feedback scaffolding aligned with learners' proficiency levels.
2. **Pedagogical Authority** – Teachers retain decision-making control over curriculum design, assessment interpretation, and socio-cultural mediation.
3. **Ethical Governance** – Institutional and policy frameworks regulate data privacy, algorithmic bias, and equitable access.

The framework argues that AI effectiveness in EFL/ESL education is not determined by technological sophistication alone, but by the quality of its pedagogical integration and ethical regulation. Without this balance, AI-driven personalization risks reinforcing linguistic standardization and educational inequities rather than promoting meaningful language development.

Benefits of AI in EFL/ESL Education

The integration of Artificial Intelligence (AI) into English as a Second Language (ESL) and English as a Foreign Language (EFL) instruction has transformed traditional teaching methodologies by fostering personalized learning, enhancing automated feedback, incorporating gamification, and facilitating interactive conversational simulations. These advancements contribute to a paradigm shift from teacher-centered instruction to student-centered engagement, making language acquisition more effective and learner-driven. However, while AI presents notable advantages, its implementation must be critically examined through theoretical frameworks such as Computer-Assisted Language Learning (CALL), Second Language Acquisition (SLA) theories, and AI-driven pedagogy.

1. Personalized Learning

AI's ability to tailor learning experiences to individual student needs is one of its most significant advantages in language acquisition. Traditional classrooms often follow a one-size-fits-all approach, whereas AI-powered platforms analyze learners' strengths and weaknesses to customize lesson plans and instructional materials (Alshumaimeri & Alshememry, 2023; Hossain & Al Younus, 2025). These adaptive learning technologies align with principles from SLA theories, particularly Krashen's Input Hypothesis and Vygotsky's Zone of Proximal Development, by ensuring that students receive comprehensible input at the right level of challenge (Yaseen et al., 2025).

Programs such as Carnegie Speech, Mondly, and Duolingo employ AI-driven adaptive algorithms to adjust lesson complexity, pace, and content dynamically. For instance, Carnegie Speech utilizes AI-based speech recognition to assess pronunciation accuracy and fluency, offering personalized drills to refine articulation (Baskara, 2025; Li et al., 2025). Similarly, Mondly personalizes lesson plans based on real-time learner progress, ensuring a balance between challenge and support (Alharbi & Khalil, 2023; Li et al., 2024). However, while AI personalizes learning, concerns remain about over-reliance on algorithm-driven feedback and the potential reduction of human interaction in language learning, a critical aspect emphasized by sociocultural theory.

2. Automated Assessment & Feedback

AI-powered assessment tools are reshaping language evaluation by providing real-time, objective feedback. Traditional assessment methods in ESL/EFL classrooms are time-intensive and prone to subjectivity, whereas AI-driven systems facilitate efficiency and accuracy (Liando et al., 2025; Lingaiah et al., 2024). Platforms such as Grammarly, Write & Improve, and e-rater employ Natural Language Processing (NLP) to assess grammar, coherence, and writing style, aligning with formative assessment principles (Alsaedi, 2024; Sharifuddin & Hashim, 2024).

Furthermore, AI speech tools such as SpeechAce and Google Speech-to-Text analyze pronunciation and fluency, pinpointing errors and offering corrective suggestions (Baskara, 2025; Du & Daniel, 2024). Research indicates that AI-generated feedback fosters self-directed learning by enabling students to identify and correct their mistakes independently (Alharbi & Khalil, 2023; Lingaiah et al., 2024). Nevertheless, ethical concerns regarding AI bias and data privacy in automated assessment must be

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addressed, as AI models may exhibit limitations in accurately assessing non-native pronunciation or dialectical variations (Crompton et al., 2024; Soon et al., 2024).

3. Increased Engagement & Motivation

AI learning platforms enhance engagement through gamification and adaptive challenges, addressing the issue of learner motivation—a critical factor in SLA (Wu et al., 2024; Jawaid et al., 2025). Traditional ESL instruction often struggles to maintain student interest, whereas AI-powered applications incorporate game-based elements to sustain engagement (Yuan, 2023).

Applications such as Duolingo, Mondly, and LingQ use gamification techniques—including badges, leaderboards, and achievement-based rewards—to reinforce intrinsic motivation and cognitive reinforcement (Dai & Liu, 2024; Halkiopoulos & Gkintoni, 2024). For instance, Duolingo's streak feature encourages consistent practice, while Mondly's AI-driven lessons adapt to learner preferences, fostering an immersive learning environment (Yaseen et al., 2025). Additionally, AI-powered Virtual Reality (VR) and Augmented Reality (AR) tools, such as ImmerseMe and Mondly VR, simulate real-world language use, facilitating experiential learning (Alshumaimeri & Alshememry, 2023; Koç & Savaş, 2025).

Despite these advantages, over-gamification may lead to superficial learning, where students focus on achieving rewards rather than developing linguistic competencies. Therefore, AI-driven gamification should be designed to complement rather than replace traditional pedagogical strategies.

4. AI Chatbots & Conversational Agents

Conversational AI has emerged as a valuable tool for improving spoken English proficiency, particularly for learners with limited exposure to native speakers (Alharbi & Khalil, 2023; Lingaiah et al., 2024). AI chatbots facilitate real-time, interactive communication, reducing language anxiety and fostering confidence in speech production.

Chatbots such as ChatGPT, Andy English Bot, and Replika AI provide immediate feedback on grammar, vocabulary, and pronunciation (Koç & Savaş, 2025; Soon et al., 2024). For example, ChatGPT enables learners to engage in role-playing scenarios, while Andy focuses on grammar reinforcement (Du & Daniel, 2024; Laksanasut, 2024). These tools align with the Interactionist Theory of SLA, which emphasizes meaningful communication as a crucial component of language acquisition (Li et al., 2024; Nadeem et al., 2025).

However, AI chatbots lack the contextual awareness and cultural nuances present in human conversation. While they serve as valuable supplementary tools, they should not replace authentic communicative interactions in ESL/EFL classrooms (Halkiopoulos & Gkintoni, 2024; Mohammad Ali, 2023). Additionally, ethical concerns related to user data collection and AI-generated responses necessitate careful oversight to ensure responsible AI deployment in education.

Artificial intelligence has introduced various tools that are reshaping EFL/ESL instruction. These tools enhance language learning by providing personalized experiences, real-time feedback, and adaptive learning opportunities. However, their effectiveness varies depending on their functions, benefits, and potential challenges. Table 3 provides an overview of key AI applications in language learning, highlighting their roles, advantages, and limitations.

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Table 3. *AI Applications in EFL/ESL Education*

AI Tool	Function	Benefits	Challenges
Chatbots	Conversational practice, grammar correction	Immediate feedback, engagement, accessibility	Limited contextual understanding, bias in responses
Adaptive Learning	Personalized learning paths	Tailored instruction supports diverse learners	Requires high-quality training data
Speech Recognition	Pronunciation feedback, speaking assessments	Enhances speaking skills, self-paced learning	Struggles with non-native accents, privacy concerns
Automated Assessment	AI-generated grading, writing feedback	Reduces teacher workload, faster feedback	Can misinterpret nuanced language use

The integration of AI in EFL/ESL education has transformed pedagogical practices by enhancing personalization, automating assessment, increasing engagement, and improving conversational proficiency. However, AI-driven instruction must be critically examined through theoretical and ethical lenses to maximize its pedagogical effectiveness while mitigating potential drawbacks. Future research should investigate the long-term impact of AI on learner autonomy, the role of human instructors in AI-enhanced classrooms, and policy frameworks to ensure equitable access to AI-powered language learning tools. Addressing these considerations will be essential for fostering inclusive and effective AI-driven language education.

Challenges & Ethical Considerations

The integration of AI in Foreign Language Teaching (FLT) and English as a Second Language (ESL) instruction presents both opportunities and ethical challenges. While AI-driven tools offer personalized learning and automation, they also introduce concerns regarding algorithmic bias, data privacy, teacher readiness, and digital accessibility. This section critically examines these challenges and proposes policy recommendations to mitigate their impact, ensuring AI is equitably and effectively deployed in language education.

1. Algorithmic Bias & Cultural Sensitivity

A key concern in AI-driven language acquisition is bias embedded in algorithms. AI systems are trained on large linguistic datasets, often dominated by native English varieties (Alharbi & Khalil, 2023; Jawaid et al., 2025). This can lead to underrepresentation of non-native English speakers, resulting in misinterpretations and biases against regional English variations such as Indian, African, and Singaporean English (Alshumaimeri & Alshememry, 2023; Sharifuddin & Hashim, 2024). Similarly, AI speech recognition systems struggle with diverse accents, misjudging pronunciation and comprehension (Dai & Liu, 2024; Lingaiah et al., 2024).

Furthermore, automated essay grading tools often fail to recognize rhetorical structures rooted in non-Western academic traditions, leading to unfair assessments of students from different cultural backgrounds (Hossain & Al Younus, 2025; Abedi et al., 2025). These biases undermine AI's potential as an inclusive educational tool.

To address these issues, AI developers must ensure training data encompasses a diverse range of linguistic and cultural inputs. Policymakers should advocate for cultural sensitivity standards in AI-based language tools, while educators can play a crucial role by incorporating human oversight in AI assessments. AI systems should also offer customizable English variants (e.g., British, American, African English) to accommodate learners' linguistic identities.

Despite claims that AI enhances inclusivity through personalization, this review argues that AI-driven personalization may paradoxically reinforce linguistic hegemony. Many adaptive systems privilege

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standardized Inner-Circle English norms embedded within training datasets, subtly positioning these varieties as the benchmark of correctness. As a result, learners' linguistic identities and localized Englishes risk being framed as "errors" rather than legitimate communicative resources. This tension reveals a fundamental contradiction: while AI promises individualized learning, it often operates within structurally narrow linguistic parameters, thereby limiting epistemic diversity. Addressing this issue requires a shift from accuracy-centric AI design toward plurilingual-aware pedagogical architectures, an area that remains underexplored in current AI-EFL research.

2. Data Privacy & Security

The use of AI in language learning involves extensive data collection, including students' demographics, learning progress, and interaction patterns (Dai & Liu, 2024; Hossain & Al Younus, 2025). While such data enhances adaptive learning, it raises risks of identity theft, hacking, and unauthorized third-party access (Alshumaimeri & Alshememry, 2023; Harishbhai et al., 2024). Machine learning algorithms that refine AI tools based on user data may also compromise student anonymity (Crompton et al., 2024; Li et al., 2025).

To safeguard learner privacy, educational institutions and policymakers must enforce stringent data protection measures, such as end-to-end encryption and restricted access protocols. Compliance with global data privacy regulations, including the General Data Protection Regulation (GDPR) and the Children's Online Privacy Protection Act (COPPA), is essential for responsible AI integration in ESL education (Mennella et al., 2024; Yuan, 2023). Transparency in AI-driven learning platforms regarding data collection and usage should be mandated to foster student trust and ethical AI deployment.

3. Teacher Readiness & Training

Despite AI's transformative potential in language education, many educators lack the necessary training to integrate AI into their teaching methodologies effectively (Alharbi & Khalil, 2023; Ayanwale et al., 2022). Rapid technological advancements pose challenges for teachers unfamiliar with AI-powered tools, such as automated feedback systems and learning analytics. Concerns over AI replacing human instruction further contribute to resistance toward adoption (Sharifuddin & Hashim, 2024; Khattak et al., 2025).

To address this gap, teacher professional development programs should incorporate AI literacy, emphasizing the role of AI as a complement rather than a replacement for human instruction. Institutions should invest in hands-on AI workshops that enable educators to experiment with AI tools in practical settings. Additionally, policies should delineate AI's role in teaching, ensuring human oversight remains central to pedagogical decision-making (Kim, 2024; Soon et al., 2024).

4. Digital Divide & Accessibility

AI-driven language learning tools remain inaccessible to many students due to socio-economic disparities (Alharbi & Khalil, 2023; Khattak et al., 2025). Limited access to high-speed internet, expensive subscription-based AI applications, and a lack of basic digital infrastructure hinder equitable AI adoption in underprivileged communities (Abedi et al., 2025; Johnson & Davis, 2024). AI speech recognition, for instance, requires continuous internet connectivity, making it impractical for learners in low-resource settings (Alsaedi, 2024; Halkiopoulos & Gkintoni, 2024; Nadeem et al., 2025).

Bridging the digital divide requires policy interventions at multiple levels. Governments and educational institutions should prioritize the development of low-cost or open-access AI tools tailored for marginalized communities. Public-private partnerships can facilitate subsidized AI language learning programs, ensuring equal access for learners regardless of their socio-economic backgrounds (Dai & Liu, 2024; Lingaiah et al., 2024). Additionally, AI literacy initiatives should be integrated into teacher training programs to empower educators in resource-limited settings.

While AI provides numerous benefits for language learning, its adoption comes with ethical and pedagogical challenges. Ethical concerns include data privacy, algorithmic bias, and unequal access to AI tools. Pedagogically, educators must navigate issues such as teacher readiness, over-reliance on AI, and the

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balance between human instruction and automated learning. Figure 1 visually represents the intersection of these concerns, illustrating how they influence the implementation of AI in EFL/ESL education.

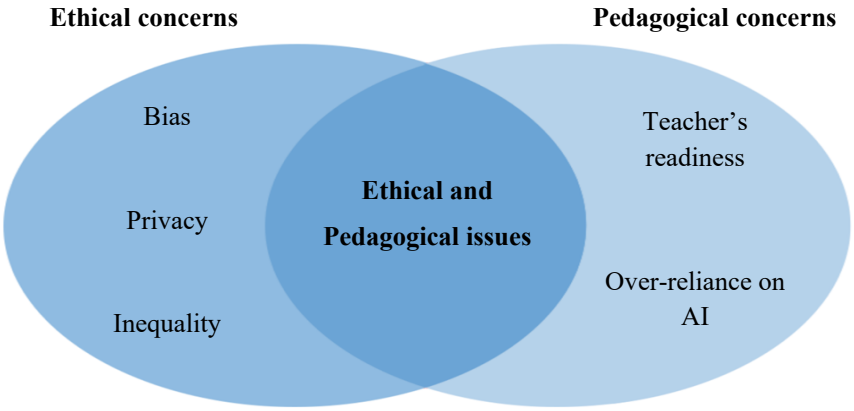

Figure 1. The concerns influencing the implementation of AI in EFL/ESL education

To maximize AI's benefits in language learning while mitigating ethical concerns, a balanced policy framework is necessary. Policymakers should establish clear guidelines on AI fairness, data privacy, and accessibility. Educational stakeholders must actively engage in shaping AI development to align with pedagogical best practices and ethical considerations.

Future research should explore the long-term impacts of AI on language learning outcomes, particularly for diverse learner populations. Additionally, interdisciplinary collaborations between AI developers, linguists, and educators can ensure AI applications are both technologically robust and pedagogically sound. By addressing these challenges, AI can serve as an inclusive and equitable tool in language education, enhancing learning experiences while upholding ethical standards.

Future Directions & Recommendations

The integration of AI in EFL/ESL instruction has sparked debate among educators, researchers, and policymakers. While some argue that AI enhances personalized learning and accessibility, others caution against potential drawbacks such as reduced human interaction and ethical risks. Table 4 presents a comparative analysis of these perspectives, outlining key arguments both in favor of and against AI in language education.

Table 4. *Comparative Perspectives on AI in EFL/ESL Education*

Perspective	Arguments For AI in EFL/ESL	Arguments Against AI in EFL/ESL
Proponents	AI enhances personalized learning, immediate feedback, and accessibility for remote learners.	AI can supplement but not replace teachers.
Critics	AI can reinforce biases, compromise data privacy, and create dependence on technology.	Risks of over-reliance, potential job displacement for educators.

The integration of Artificial Intelligence (AI) in ESL and EFL teaching presents both opportunities and challenges. While AI can enhance language learning through personalized feedback, adaptive learning, and automated assessment, its ethical, pedagogical, and fairness considerations require ongoing scrutiny.

Citation
Laksanasut, S. (2026). Artificial Intelligence in EFL/ESL Education: Transforming Language Learning and Teaching through Adaptive Technology and Ethical Innovation. International Journal of Sociologies and Anthropologies Science Reviews, 6 (1), 211-224; DOI: https://doi.org/10.60027/ijsasr.2026.10022

International Journal of Sociologies and Anthropologies Science Reviews
Volume 6 Issue 1: January-February 2026: ISSN 2985-2730
Website: https://so07.tci-thaijo.org/index.php/IJSASR/index

This section explores how AI can be integrated effectively into ESL/EFL education while addressing its limitations and ensuring equitable access.

1. Teacher-AI Collaboration

AI cannot replace human teachers but can serve as an assistive tool to enhance their pedagogical effectiveness. AI-driven assessment tools can grade assignments and provide feedback, yet they lack the nuanced emotional intelligence necessary for motivating and understanding students (Alharbi & Khalil, 2023; Kim, 2024). A balanced approach, integrating AI as a supplement rather than a replacement, aligns with principles from CALL (Computer-Assisted Language Learning) and SLA (Second Language Acquisition) theories, which emphasize interaction and context-specific learning.

Teachers must critically evaluate AI-generated content, ensuring it aligns with cultural and linguistic contexts (Koç & Savaş, 2025; Laksanasut, 2024; Yuan, 2023). While AI chatbots facilitate conversation practice, educators play a crucial role in guiding discussions, addressing misconceptions, and fostering authentic communication (Abedi et al., 2025; Lingaiah et al., 2024). Additionally, AI analytics can detect learning gaps, but teachers must interpret this data to design tailored interventions (Du & Daniel, 2024; Yaseen et al., 2025; Zou & Wang, 2024).

To maximize AI-teacher collaboration, educational institutions should invest in professional development programs focused on AI literacy, data-driven pedagogy, and ethical AI integration (Ayanwale et al., 2022; Hossain & Al Younus, 2025). Equipping teachers with AI competencies will enhance their ability to harness technology for improved learning outcomes.

2. Policy & Ethical Guidelines

As AI adoption in education increases, regulatory frameworks must ensure fairness, transparency, and data privacy. AI algorithms, if trained on biased datasets, risk perpetuating inequities in language assessment, speech recognition, and automated grading (Jawaid et al., 2025; Yuan, 2023; Zou & Wang, 2024). Policymakers should mandate AI developers to incorporate diverse linguistic data and conduct bias audits (Dai & Liu, 2024; Sharifuddin & Hashim, 2024).

Data privacy regulations such as GDPR and COPPA should be enforced to protect student information from misuse (Harishbhai et al., 2024; Soon et al., 2024). Furthermore, AI should serve as a non-judgmental and transparent learning aid, ensuring that students are not unfairly disadvantaged due to regional dialects or non-Western writing conventions (Lingaiah et al., 2024; Mohammad Ali, 2023). Institutions should implement policies requiring human oversight in AI-generated assessments to mitigate biases and enhance reliability (Alharbi & Khalil, 2023; Crompton et al., 2024).

3. Equity & Inclusion Strategies

A significant barrier to AI integration in ESL/EFL learning is the digital divide. Students from low-income and rural backgrounds may lack access to AI-driven tools due to infrastructure limitations (Du & Daniel, 2024; Khattak et al., 2025). To bridge this gap, governments should implement policies that promote equitable access, such as subsidized AI resources and public-private partnerships for educational technology expansion (Alharbi & Khalil, 2023; Johnson & Davis, 2024).

Offline AI solutions should be developed to support students in low-connectivity regions (Abedi et al., 2025; Halkiopoulos & Gkintoni, 2024). Additionally, digital literacy programs must be incorporated into teacher training to ensure marginalized educators and students can effectively engage with AI in language learning (Alsaedi, 2024; Ayanwale et al., 2022). Establishing AI-supported community learning centers, such as public libraries and NGOs, can further support underprivileged students by providing AI-enabled tutoring and assessment tools (Alshumaimeri & Alshememry, 2023; Lingaiah et al., 2024).

4. Further Research Areas

Despite AI's growing role in language education, several research gaps remain. Future studies should investigate AI's impact on language creativity and higher-order thinking skills, as most current applications focus on accuracy and fluency rather than innovation (Dai & Liu, 2024; Nadeem et al., 2025; Zou & Wang, 2024). Additionally, AI's influence on spontaneous conversational ability requires deeper

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exploration, as current speech recognition technologies primarily assess pronunciation rather than natural discourse flow (Baskara, 2025; Li et al., 2025; Mohammad Ali, 2023).

Bias mitigation in AI-assisted language learning should also be prioritized. Future research should examine strategies for reducing algorithmic biases in grammar and speech assessment (Jawaid et al., 2025; Yuan, 2023). Longitudinal studies are needed to evaluate AI's impact on motivation and proficiency in real classroom settings (Du & Daniel, 2024; Xiao et al., 2025). Addressing these gaps will enable a more effective and responsible AI integration in ESL/EFL education.

While AI presents transformative opportunities in language learning, its implementation must be guided by ethical policies, equitable access initiatives, and continued pedagogical refinement. Stakeholders—including educators, policymakers, and researchers—must collaborate to ensure that AI remains an asset rather than a hindrance in language education. By adopting a balanced and research-driven approach, the ESL/EFL field can maximize AI's potential while minimizing its risks, ultimately improving student experiences and learning outcomes.

Conclusion

This critical review demonstrates that Artificial Intelligence has the capacity to significantly enhance EFL/ESL education through personalization, automated feedback, and expanded opportunities for language practice. However, its educational value is not inherent in the technology itself, but in how AI is pedagogically framed, ethically governed, and human-mediated. The synthesis of current literature reveals that while AI can support learner autonomy and instructional efficiency, uncritical adoption risks reinforcing linguistic standardization, algorithmic bias, and pedagogical dependency.

The key contribution of this paper lies in reframing AI as a supportive pedagogical agent rather than a substitute for human instruction, emphasizing the necessity of teacher authority, cultural mediation, and ethical oversight. The proposed Human-Centered AI–EFL Pedagogy Model offers a conceptual pathway for integrating AI in ways that preserve linguistic diversity, protect learner data, and promote equitable access.

These insights can inform curriculum design, teacher professional development, and institutional policy-making, particularly in contexts where AI adoption is accelerating faster than pedagogical regulation. Future research should move beyond tool-based evaluations to examine how AI reshapes learner identity, linguistic legitimacy, and classroom power dynamics over time. When applied critically and responsibly, AI has the potential not only to improve language learning efficiency but to redefine the ethical and pedagogical foundations of EFL/ESL education.

Declaration of Generative AI in the Writing Process

The author employed Grammarly to improve readability and language during the preparation of this work. Following its use, they carefully reviewed and revised the content to ensure accuracy, coherence, and alignment with the intended purpose. The author takes full responsibility for the final version of the publication.

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Citation
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