

Artificial Intelligence in Saudi English Language Classrooms: A Narrative Review

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Received: January 18, 2026

Accepted: April 11, 2026

Online Published: May 25, 2026

doi:10.5430/wjel.v16n5p254

URL: <https://doi.org/10.5430/wjel.v16n5p254>

Abstract

Artificial Intelligence is revolutionizing English language learning, transforming the teachers' approach to their pedagogy, engaging students more actively, and mentoring learning outcomes in Saudi Arabian EFL classrooms. This review examines how AI is currently being employed, assessing its applications, the readiness of institutions to adopt it, and the challenges it encounters, while also evaluating its impact on English language skills, student autonomy, and the flexibility of learning. The study examines how AI is used in instructional practices, the curricular content it supports, and the governing principles that guide its use, emphasizing cultural relevance, ethical integrity, and evidence-based implementation. Tools with AI integration offer quick feedback and support tailored to individual learners in EFL classrooms. They further facilitate pedagogical modifications contingent upon empirical data. The efficacy of these instruments, nevertheless, is predominantly dependent on the educator's proficiency, the accessibility of suitable technological assets, and the contextual relevance of the system. The imperative for systematic governance and professional advancement is underscored by ethical considerations, including data privacy, algorithmic bias, and the risks of excessive dependence. This review combines global and local insights to help teachers, policymakers, and researchers make informed decisions about utilizing AI in EFL instructions and shaping its future.

Keywords: artificial intelligence, English language teaching, EFL classrooms, TESOL proficiency, educational technology

1. Introduction

Artificial intelligence (AI) has rapidly emerged as a pivotal technological powerhouse, transforming modern educational frameworks worldwide (Kobylarek, 2025). Over the past decade, educational institutions have increasingly adopted AI-driven technologies to address persistent challenges in teaching and learning, while enhancing the quality, accessibility, and effectiveness of the learning experience. Worldwide numbers indicate that over 120 million students are now utilizing AI-driven learning platforms, underscoring a profound shift in global educational delivery models (UNESCO, 2023). Presently, across diverse educational settings, AI tools play an increasingly central role in enhancing traditional teaching methods, particularly in language learning, where personalized feedback, maintaining student interest, and providing regular exposure to the language are crucial for effective learning (Chen et al., 2020). AI-powered platforms are highly flexible, as they can adapt in real-time and track learners' progress with precision, making them leaders in today's educational landscape (Holmes et al., 2019). These changes underscore how educational systems worldwide have begun to recognize AI as a pivotal component of the education landscape moving forward (Chernenko, 2024).

In Saudi Arabia, this global trend has resonated particularly well with the country's educational plans. Under the ambitious Vision 2030 initiative, Saudi Arabia clearly prioritizes digital transformation across all sectors, particularly in education, aiming to empower its citizens with essential 21st-century skills and competencies. In 2025, the Department of Education unveiled a comprehensive AI syllabus that spans its entire education system, effective for the 2025–2026 academic year, marking a significant advancement in the country's educational transformation. This endeavor aligns with the nation's goal to emerge as a leader in the realm of artificial intelligence, highlighting the importance of technological proficiency in driving economic diversification and enhancing national competitiveness (Saudi Gazette, 2025). The incorporation of AI into conventional education is thus more than just a technological choice; it represents a calculated educational investment. In this expansive context, teaching languages, especially English as a foreign language (EFL), has increasingly emerged as a focal point where AI technologies can significantly enhance teaching methods and address persistent educational challenges.

In the Saudi Arabian context, the challenges students face in learning English have been examined in the academic literature. Studies consistently highlight difficulties in oral fluency, vocabulary retention, writing accuracy, and exposure to authentic communicative contexts, difficulties often linked to large classroom sizes, uneven instructional quality, and limited opportunities for individualized practice (Al-Nasser, 2015; Alharbi, 2019; Alharbi, 2015; Masoudi, 2024; Al-Mohanna, 2024; Alam et al., 2026, Ahmad & Alam, 2024). As a result of these structural and instructional constraints, these difficulties often persist throughout various stages of education, contributing to persistent gaps between anticipated and actual proficiency results. Given these recurring challenges, innovative AI-driven technologies offer promising solutions by providing ongoing feedback, engaging educational settings, and offering personalized learning paths tailored to the unique needs of each learner (Jančařík et al., 2023). In support of this potential, research indicates that smart tutoring platforms and applications powered by natural language processing (NLP) can enhance essential language abilities, boost learners' confidence, and alleviate stress by facilitating repeated practice in a relaxed environment (Yan et al., 2025). Nevertheless, despite these promising outcomes, the effectiveness of these tools depends on the complex interaction of educational, technological, and situational factors that require careful assessment within the Saudi learning environment.

Despite encouraging advancements, the incorporation of AI into Saudi language education remains sporadic and limited in scope. Alammari (2024) and Alam et al., (2025) noted in their research that, although both students and teachers tend to have a positive perspective on AI, its practical usage is somewhat restricted due to a shortage of training, insufficient infrastructure, and a need for more localized AI resources. Consequently, these limitations highlight the discrepancies between national policy goals and actual classroom practices. For instance, even though institutions may have advanced tools like smartboards, tablets, or online learning platforms, effectively incorporating AI-driven systems often requires additional training that many educators have not yet received. In addition to training concerns, it has been noted that AI tools developed in Western settings may not fully align with Arabic-English bilingual frameworks, which can lead to errors in automated responses and a decline in overall efficiency (Alsaawi, 2025; Alam et al., 2022). Thus, bringing AI into EFL classrooms in Saudi Arabia goes beyond merely having the technology at hand; it also requires a thoughtful consideration of the cultural, linguistic, and institutional factors that influence the learning environment.

Global studies provide additional perspectives on how AI can revolutionize language learning. Drawing on this growing body of evidence, a recent meta-analysis of 40 research studies, conducted with rigorous methodological procedures, found that using AI to support English language teaching has a profoundly positive impact on student success, with an effect size of $g = 0.812$ compared to traditional teaching methods (Liu et al., 2025). Building on this evidence, other large-scale studies demonstrate that AI-powered tools can significantly enhance individuals' reading, writing, and speaking abilities by providing them with tailored lessons and instant feedback (Kohnke & Zou, 2025; Kohnke et al., 2025, Alam & Usama, 2024). These findings demonstrate the potential of AI in supporting teachers by providing them with intelligent data, automated assistance, and maintaining student engagement for longer periods. However, despite these promising global findings, one must not hastily presume that a successful strategy in one context will yield equivalent results in all other situations. Indeed, differences in how education is viewed, the readiness of teachers, the facilities available, and the languages spoken necessitate conducting local research to determine if what works globally can be effectively applied to Saudi Arabia.

Aside from the pedagogical advantages, incorporating AI into language learning also aligns with broader educational aspects, such as maintaining motivation, managing the amount of information learners can process, and enabling students to take charge of their own learning (Alam et al., 2025). AI tools typically utilize sophisticated algorithms that analyze how students learn, identify trends in their mistakes, and adjust the difficulty of tasks to make learning more seamless. Through these adaptive mechanisms, these tools are designed to enhance cognitive engagement and reduce unnecessary learning stress, which in turn helps learners retain language information more effectively (Holmes et al., 2021; Shams et al., 2025). Despite these potential benefits, concerns remain about the trustworthiness and usefulness of feedback from machines for learning purposes. Automated systems may fail to capture some of the subtleties in how learners actually communicate, including discourse structuring or the way language is used in different cultures. Additionally, there are significant ethical concerns surrounding algorithm bias and data privacy issues, particularly in areas where technology setups are still being established. These concerns highlight the importance of thoroughly examining AI systems before implementing them extensively in Saudi institutions.

With all the momentum surrounding national policies, emerging research, and ongoing hurdles, there is a clear need for a comprehensive overview that consolidates what is currently known about using AI in Saudi language classes. Previous research has explored learner perceptions and technological readiness; however, a significant gap remains in understanding how AI tools impact teaching outcomes, institutional settings, and policy (Alam, 2025a). A systematic review can provide key information on the extent to which AI is being utilized, its actual impact on language skills, and the challenges that need to be addressed to ensure effective and sustainable implementation. The review plays a critical role in informing how we develop curricula, support teachers' growth, and shape next-generation AI tools for Saudi students.

Accordingly, the present review aims to (1) examine the current state of AI adoption in Saudi English language classrooms, including applications, institutional readiness, and observed challenges; (2) assess the effectiveness of AI in enhancing language learning outcomes, particularly in relation to skill development, learner engagement, and personalized learning pathways; and (3) identify pedagogical, curricular, and policy implications for integrating AI into language instruction in Saudi Arabia. By synthesizing existing evidence within both global and local contexts, this review seeks to provide educators, policymakers, and researchers with a comprehensive, evidence-based foundation for informed decision-making and future innovation in language education.

To ensure a systematic and critical examination of the literature, this review adopts a three-dimensional analytical framework encompassing technological, pedagogical, and contextual dimensions. The technological dimension focuses on the types and functionalities of AI tools, including automated writing evaluation systems, speech-recognition applications, and adaptive learning platforms. The pedagogical dimension evaluates the impact of these technologies on language skill development, learner engagement, and autonomy. The contextual dimension examines institutional readiness, infrastructural constraints, and socio-cultural factors influencing AI integration, particularly within the Saudi educational context. This framework enables a structured synthesis of existing research and facilitates a comparative and critical analysis of findings across studies.

2. Methodology

This study adopts a structured narrative review design to synthesize existing research on the integration of artificial intelligence (AI) in English language learning, with particular emphasis on English as a Foreign Language (EFL) context and the Saudi Arabian educational setting. While narrative reviews are traditionally descriptive, the present study follows a systematic and transparent approach to literature selection and analysis in order to enhance methodological rigor and ensure the reliability of the synthesized findings (Kobylarek & Wotus, 2011).

The literature search was conducted across major academic databases, including Scopus, Web of Science, Google Scholar, and ERIC. A combination of keywords and Boolean operators was employed to retrieve relevant studies, including “artificial intelligence,” “AI in education,” “EFL learning,” “language teaching,” “automated writing evaluation,” “speech recognition,” and “Saudi Arabia.” The search process was limited to studies published between 2015 and 2025 to capture recent developments in AI-driven educational technologies and their application in language learning environments. Reference lists of selected articles were also manually screened to identify additional relevant studies through backward citation tracking.

Clear inclusion and exclusion criteria were established to guide the selection process. Studies were included if they (i) were published in peer-reviewed journals, (ii) focused on the application of AI in English language teaching or learning, (iii) addressed EFL contexts, and (iv) provided empirical evidence, theoretical insights, or systematic reviews relevant to language education. Particular consideration was given to studies conducted in Saudi Arabia or in comparable educational contexts to maintain contextual relevance. Conversely, studies were excluded if they (i) focused on AI applications outside language education, (ii) lacked sufficient methodological detail, (iii) were opinion-based or non-scholarly publications, or (iv) were not accessible in full text.

Following the selection process, the included studies were analyzed using a thematic and analytical approach. The review categorizes findings across technological, pedagogical, and contextual dimensions to enable systematic comparison and critical synthesis. This analytical procedure allows the study to move beyond descriptive reporting and to identify convergences, divergences, and gaps within the existing literature on AI-supported language learning.

3. Background and Educational Mechanisms

Artificial intelligence has emerged as a central technological construct in contemporary language education, operating through computational architectures that integrate automation, predictive modelling, adaptive calibration, and algorithmic feedback to regulate instructional processes at multiple levels (Zawacki-Richter et al., 2019; Luckin et al., 2016). These systems, driven by natural language processing and large-scale machine learning models, evaluate learner-generated input by mapping phonological, lexical, syntactic, and discourse features against statistical representations of proficient language use (Holmes et al., 2021). Building on these analytical capabilities, innovative AI resources, such as smart tutoring platforms, automated assessment tools for writing, and voice recognition software, continuously monitor student performance, identifying frequent mistakes and adjusting educational paths as needed (Chen et al., 2020; Alam, 2025b). Such mechanisms operate in a manner similar to dynamic regulatory systems, as they modulate task difficulty, reorganize content sequences, and deliver immediate corrective signals that reinforce linguistic accuracy and procedural fluency. Through this coordinated set of functions and interconnected processes, AI systems simulate the core functions of expert instruction, linking computational operations with the pedagogical objective of sustaining learner progress across various linguistic domains (Woolf et al., 2013).

These computational frameworks extend into pedagogical mechanisms that structure how learners engage with language, as AI systems apply adaptive pathways to remodel instructional exposure, regulate attentional demands, and diversify linguistic input (Khosravi et al., 2022). As a result of this adaptive design, the rapidity of AI-generated feedback enables learners to undergo dense cycles of practice and correction, minimizing the consolidation of inaccurate linguistic patterns and reinforcing syntactic, morphological, and phonological precision (Yan et al., 2025). In addition, diverse interaction modes, conversationally engaging AI companions, and gamified educational settings woven into AI technologies actively engage motivational frameworks, boosting determination, reducing emotional obstacles, and broadening avenues for producing the target language (Reinders & Wattana, 2015). These interactive features scaffold learner behaviour by creating conditions wherein linguistic processing, error monitoring, and self-correction occur simultaneously, following a pattern of iterative refinement that mirrors mechanisms underlying cognitive adaptation (Ranalli et al., 2017; Alam, 2024). AI systems, moreover, accumulate micro-level data on learner behaviour, including hesitation episodes, lexical retrieval tendencies, and discourse-structuring patterns, which enable them to model learner trajectories and adjust instructional stimuli in ways that optimize exposure, engagement, and linguistic output. Through these cumulative processes, AI acts as an educational enhancer, bolstering learning environments that would be challenging to maintain consistently in traditional teaching frameworks (Zawacki-Richter et al., 2019).

These systems operate within the expansive socio-educational framework of Saudi Arabia, where national digital evolution projects, propelled by Vision 2030, have accelerated the adoption of AI-infused technologies across various organizations. Technology infrastructures, smart-learning environments, and platform-based instructional models have expanded substantially, yet the linguistic ecology of English learning remains shaped by persistent challenges, including limited access to authentic communicative interactions, variation in teacher expertise, and classroom sizes that constrain individualized feedback (Alharbi, 2021). In this framework, AI tools serve as potential enhancement systems, offering structured guidance, prompt feedback, and personalized language assistance to students who may otherwise lack access to personalized support. Nevertheless, the impact of AI in Saudi educational environments is influenced by the preparedness of infrastructure, the digital skills of educators, and how well AI algorithms correspond with the language characteristics of Arabic-English bilingual students. Research indicates significant disparities in internet access, tool availability, and platform usability across different regions, which impact the stability and reliability of AI-driven teaching (Alammari, 2024). Furthermore, AI systems developed using Western linguistic corpora may misinterpret features characteristic of Arabic-influenced English, resulting in inaccurate corrective outputs or misclassifying structural patterns (Alafnan, 2025). These contextual variables interact with technological and pedagogical mechanisms in ways analogous to the environmental influences described in the model's mechanistic analysis, demonstrating how systemic conditions regulate the implementation, performance, and educational impact of AI in Saudi English language classrooms.

4. Current State of AI Adoption in Saudi English Language Classrooms

Artificial-intelligence (AI) technologies have begun to permeate Saudi EFL classrooms in a heterogeneous yet accelerating pattern, driven largely by institutional policies, individual teacher initiative, and the growing availability of commercial language platforms. Among the most widely adopted tools are AI-powered writing assistants, automated feedback systems, and speech-recognition applications, alongside commercial platforms such as Grammarly, ChatGPT, and Duolingo (Alharbi, 2023; AbdAlgane & Osman, 2023). These resources are increasingly integrated into both formal instruction and independent learning practices, reflecting a broader shift toward technology-mediated language development in Saudi higher education settings.

Recent studies emerging from Saudi Arabia indicate generally positive yet contextually constrained outcomes. A study of 285 undergraduate EFL students found that AI tools not only improved writing performance but also enhanced learner motivation and self-efficacy, particularly for students with lower baseline proficiency levels (Alyami et al., 2025). Complementary evidence from Alzubi and Alelaiwi (2025) found that Saudi EFL teachers exhibit predominantly favorable attitudes toward generative AI tools, yet they exercise caution regarding their use due to concerns about academic integrity and over-reliance. Similarly, Alam and Usama (2023) conducted an experimental study showing that AI-based e-feedback significantly reduced writing errors among ESL students, while Alenezi and Alenezi (2025) demonstrated that AI formative assessment tools contributed to enhanced student engagement and improved learning outcomes across several Saudi universities.

Even with these reported benefits, the integration of AI is hindered by some significant structural, teaching method, and institutional barriers. In a mixed-methods study, Alammari (2024) identified that although student and teacher attitudes toward AI are largely favorable, actual classroom implementation remains inconsistent due to training deficiencies, resource limitations, and a dearth of AI solutions adapted to the local linguistic context. This pattern is consistent with findings from Alzubi and Alelaiwi (2025), who reported that educators in Saudi institutions often feel underprepared to effectively guide students in using AI tools, particularly in contexts that demand critical evaluation of AI-generated content. Complementary to these pedagogical constraints, Alam et al. (2025) found that digitalization in higher education, including AI adoption, introduces challenges related to virtual pedagogical competence, including gaps in faculty training, technological infrastructure, and learner readiness.

These small-scale and structural limitations are exacerbated by deficiencies at the institutional and policy levels that impede the coherent and equitable deployment of AI in Saudi EFL classrooms. While the national Vision 2030 agenda explicitly prioritizes AI literacy and digital integration, the translation of these policy objectives into instructional practice remains uneven. Banafi (2025) notes that students in Saudi institutions perceive English language programs as inadequately aligned with 21st-century digital realities, underscoring a gap between policy ambition and ground-level implementation. Similarly, Alsaawi (2025) identifies that AI chatbots, though perceived as beneficial, are often resisted or underutilized due to limited instructor guidance, low technological confidence among learners, and mismatches between AI tool design and the sociolinguistic features of Arabic-influenced English.

Nonetheless, the existing trend of adoption, merging evident advantages with enduring structural and institutional hurdles, reflects the current state of AI in Saudi EFL. Despite these hurdles, the trajectory of AI adoption in Saudi EFL classrooms appears to be moving toward greater institutionalization, fueled by ongoing policy investment, increasing teacher awareness, and growing learner familiarity with AI-mediated learning environments.

Overall, the reviewed studies indicate that while AI adoption in Saudi EFL classrooms is expanding, its implementation remains fragmented and context-dependent. Progress is most visible in higher education settings where institutional support and learner autonomy intersect, but significant gaps persist in teacher training, localized AI design, and policy translation. These challenges form the backdrop against which the functional effectiveness and broader implications of AI must be evaluated in subsequent sections of this review.

5. Functional Effectiveness of AI in Language Learning

AI-driven instructional technologies have demonstrated measurable effects across the four core language skills, particularly in writing and

pronunciation development. Automated Writing Evaluation (AWE) systems, such as Grammarly and Turnitin, provide learners with immediate, data-driven feedback on grammatical accuracy, vocabulary usage, and coherence, enabling iterative revision cycles that improve writing quality (Wilson & Roscoe, 2020; Alharbi, 2023). Importantly, research indicates that these tools are most effective when used formatively, as part of a scaffolded writing process, rather than as summative assessment instruments (Stevenson & Phakiti, 2014; Ranalli et al., 2017; Zhai & Ma, 2023). Similarly, speech-recognition technologies have shown promise in supporting pronunciation development, particularly for individual phonemes and prosodic features in controlled learning environments (Liakin et al., 2015; Farrús, 2023; Liakin et al., 2017).

Besides learning skills, AI-powered platforms significantly boost learners' enthusiasm, fostering sustained engagement with target language input. Gamified learning environments that integrate AI feedback mechanisms, such as Duolingo's adaptive algorithms, have shown effectiveness in increasing practice frequency and reducing language learning anxiety (Loewen et al., 2019; Domínguez et al., 2013; Reinders & Wattana, 2015). These platforms leverage intrinsic motivation by providing real-time rewards, progress tracking, and adaptive challenge levels, creating conditions that sustain learner engagement over extended periods. The ability of AI systems to offer individualized feedback at scale represents a critical pedagogical advantage, particularly in large EFL classrooms where teacher-to-student ratios often limit the quality of personalized instruction.

AI's most substantive pedagogical contribution lies in its capacity to deliver individualized and flexible learning trajectories. Adaptive learning platforms analyze learner data to identify skill gaps, adjust content difficulty dynamically, and optimize the sequence of instructional inputs (Chen et al., 2020; Holmes et al., 2021; Kohnke et al., 2025). This personalization extends beyond simple differentiation to encompass predictive modelling of learner trajectories, enabling early identification of at-risk learners and proactive instructional adjustments. Research by Li et al. (2025) comparing AI tutoring dialogues with human instruction found that while AI tutors can approximate the structural features of expert instruction, they fall short in managing affective dimensions of learning, such as emotional support and motivational calibration, particularly for learners with low self-efficacy or high anxiety.

The distinct advantage of AI in educational contexts lies in its capacity to support learner self-regulation by tracking and reflecting individual progress. Learning analytics dashboards embedded in AI platforms provide learners with visual representations of their performance trajectories, enabling metacognitive monitoring and goal-setting (Ifenthaler & Yau, 2020; Mangaroska et al., 2022; Susnjak et al., 2022). These tools align with established frameworks for self-regulated learning (Panadero, 2017; Broadbent & Fuller-Tyszkiewicz, 2018), suggesting that AI-mediated feedback environments can cultivate learner autonomy when designed to prompt reflection and self-correction rather than passive response. Mohebbi (2025) further demonstrates that systematic integration of AI tools with explicit self-regulation instruction produces significant gains in learner independence, particularly when implemented within structured scaffolding frameworks.

Despite these strengths, AI-driven tools face persistent reliability issues that limit their capacity to address complex communicative competencies. AWE systems, for example, frequently misidentify discourse-level features, fail to account for register variation, and exhibit inconsistent performance when processing language produced by non-native speakers with strong L1 transfer features, such as Arabic-influenced English (AlAfnan, 2025; El Ebyary & Windeatt, 2010). Speech-recognition systems similarly face challenges in accurately processing accented speech, leading to reduced performance accuracy for learners whose phonological patterns diverge significantly from the training data (Habbash et al., 2025). These reliability gaps not only undermine learner confidence but may also reinforce inaccurate linguistic models if learners uncritically accept erroneous AI-generated corrections.

A key constraint revolves around the excessive dependence on technology in teaching, which may lead to the marginalization of human interaction and the sociolinguistic dimensions of language development (Alam et al., 2025). Studies indicate that overreliance on AI feedback can reduce learners' engagement with peer interaction, collaborative writing, and discourse-level negotiation of meaning, all of which are essential for developing interactional competence and communicative fluency (Cao et al., 2023; Koo, 2025). Furthermore, AI systems optimized for text-based accuracy metrics may inadvertently prioritize formal correctness over communicative effectiveness, potentially shaping learners' understanding of proficiency in ways that misalign with real-world language use demands. Addressing these trade-offs requires a hybrid instructional model in which AI tools complement, rather than substitute, teacher-mediated interaction and collaborative language practice.

Overall, the reviewed evidence suggests that AI is consistently effective in enhancing lower-level linguistic skills such as grammar, vocabulary, and pronunciation accuracy, where quantifiable feedback can be efficiently generated and acted upon. Its effectiveness in developing higher-order communicative competencies, including pragmatic awareness, discourse coherence, and sociolinguistic adaptability, remains more limited and context-dependent. These findings underscore the importance of design-informed AI integration, where tools are selected and deployed based on their alignment with specific learning objectives, learner profiles, and socio-institutional contexts.

6. Pedagogical and Institutional Roles of AI

The integration of AI into English language teaching has increasingly reshaped instructional practices, particularly in feedback delivery, formative assessment, and curriculum innovation. AI-enabled writing feedback systems have reduced the time burden on instructors while providing learners with more frequent and granular evaluations of their written output (Chen & Cheng, 2008; Alshehri, 2025; Abduljawad, 2024). The integration of such systems into existing instructional frameworks is, however, contingent on educator proficiency, as teachers

who understand the limitations of AWE systems are better positioned to supplement algorithmic feedback with contextualized pedagogical commentary (Ranalli et al., 2017; Riyadini & Triastuti, 2023). This shift necessitates professional development that equips educators not only with technical competencies but also with critical frameworks for evaluating AI outputs and guiding learners in interpreting automated assessments.

AI-powered grading systems have also become increasingly influential in contemporary language courses. Automated essay scoring platforms evaluate writing on dimensions including syntactic complexity, lexical diversity, and task fulfilment, generating standardized scores that can inform grading decisions at scale (Shermis & Burstein, 2013; Wilson & Roscoe, 2020). While these systems offer efficiency gains in high-volume assessment contexts, their deployment raises significant concerns about construct validity, particularly regarding their sensitivity to non-native speaker writing patterns, cultural discourse conventions, and genre-specific rhetorical structures (Stevenson & Phakiti, 2014). Research indicates that AWE scores may not reliably capture holistic writing quality for EFL learners, suggesting that AI-generated assessments should be treated as one component within a broader, teacher-mediated evaluation framework rather than as standalone indices of proficiency.

The advancement of curricular innovation has been significantly accelerated by artificial intelligence, particularly in its capacity to support adaptive, learner-centered instructional models. AI-driven content recommendation systems can curate personalized reading and listening materials aligned with individual learner proficiency levels and interest profiles, enabling more differentiated engagement with authentic language input (Hwang & Fu, 2019; Kohnke & Zou, 2025; Alam, 2024). In addition, AI platforms facilitate the development of flipped classroom models and hybrid learning environments by providing learners with accessible, on-demand language support outside formal instructional time (Amir et al., 2025a). This expanded instructional presence enables educators to repurpose in-class time for higher-order communicative activities, collaborative tasks, and critical discussion, thereby enhancing the pedagogical depth of language courses.

The institutional integration of AI has further strengthened coordination in teaching and learning. Learning analytics dashboards embedded in AI platforms aggregate learner data across multiple performance dimensions, providing instructors with actionable insights into class-wide patterns, individual learning trajectories, and points of instructional intervention (Verbert et al., 2014; Nasseif, 2020; Alhammad, 2023; Jin et al., 2025). These tools have demonstrated capacity to support early identification of learners at risk of underperformance, enabling timely and targeted instructional support (Susnjak et al., 2022; Ifenthaler & Yau, 2020). The systemic use of such platforms within institutional settings also facilitates data-driven curriculum review, allowing program administrators to evaluate learning outcomes at scale and align instructional content with institutional and national language proficiency benchmarks.

Despite these developments, hurdles persist in ensuring that AI resources resonate culturally and linguistically with learners in the Saudi context. AI tools designed primarily for English-dominant educational environments may carry embedded cultural assumptions, rhetorical norms, and discourse conventions that diverge from the communicative practices familiar to Arabic-speaking learners (AlAfnan, 2025; Cao et al., 2023). These mismatches can undermine the authenticity and relevance of AI-generated instructional content, particularly in areas such as writing instruction, where cultural rhetorical patterns significantly influence text organization and argumentation. Addressing this challenge requires institutional investment in the contextualization of AI tools for local learner populations, including the adaptation of feedback parameters, content libraries, and assessment rubrics to reflect culturally responsive language education practices.

Recently, there has been increased attention to the customization of AI language tools for local contexts, adjusting the feedback algorithms and content libraries to better align with the linguistic and cultural characteristics of Arabic-speaking learners (Essa et al., 2025; Habbash et al., 2025). These adaptations represent a promising direction for future AI development in the Saudi EFL context, as they address the fundamental mismatch between generic AI platforms and the specific sociolinguistic realities of learners whose language use is shaped by Arabic phonological, morphological, and discursive patterns.

Collectively, the findings demonstrate that AI enhances instructional efficiency, assessment practices, and curriculum development when integrated into coherent pedagogical frameworks. However, its effectiveness as an institutional tool is contingent on educator training, contextual adaptation of AI outputs, and the establishment of evaluation protocols that account for the limitations of automated assessments. These interdependencies suggest that sustainable AI integration requires systemic coordination across institutional, pedagogical, and technological dimensions, rather than piecemeal adoption driven by individual instructor enthusiasm or market availability.

7. Challenges and Constraints in AI-Supported Language Learning

Despite the considerable potential of AI in language education, infrastructure and technological limitations continue to be among the most significant barriers to effective deployment in Saudi EFL contexts. Reliable internet connectivity, access to updated hardware, and institutional licensing for AI platforms remain unevenly distributed across different regions and institution types within Saudi Arabia, creating digital inequities that limit the scalability of AI-driven language instruction (Shammari, 2021; Al-Jarf, 2021; Alam et al., 2022). Even in well-resourced institutions, the integration of AI tools is often constrained by the technical complexity of platform adoption, the absence of dedicated technical support, and the fragmentation of AI tools across disconnected institutional systems. These infrastructural limitations are compounded by frequent updates to AI platform interfaces, which require ongoing faculty training and create instability in instructional routines.

The digital skills of educators are an essential factor in successfully integrating AI technologies into the educational environment.

Research consistently indicates that many EFL teachers in Saudi Arabia lack sufficient training in the pedagogical application of AI tools, limiting their capacity to design effective AI-mediated learning experiences and critically evaluate AI-generated feedback (Altamimi & Hussein, 2025; Alam, 2025a). This skills gap is not merely technical; it also encompasses the pedagogical knowledge required to select appropriate AI tools for specific learning objectives, scaffold learner interactions with AI platforms, and mediate between automated feedback and human instruction. Professional development programs that address this gap are currently underdeveloped in many Saudi institutions, suggesting an urgent need for systematic investment in AI-focused faculty training as a prerequisite for meaningful classroom integration.

The importance of ethical principles and data governance has become a pivotal focus in the realm of AI-enhanced language education, particularly as institutions increasingly rely on AI platforms that collect and process learner data. Key concerns include the potential for algorithmic bias in AI-generated assessments, the privacy implications of continuous learner data collection, and the risk of perpetuating inequities through AI systems trained on non-representative datasets (Yan et al., 2024; Aljabr & Al-Ahdal, 2024). In the Saudi context, these concerns are amplified by the limited availability of Arabic-language training data for AI systems, which may result in performance disparities for learners whose English is significantly influenced by Arabic phonological and grammatical features. Developing ethical governance frameworks for AI use in language education requires collaborative engagement among educators, policymakers, and AI developers, with particular attention to the needs and rights of learners in non-Western, multilingual educational environments.

Using AI in teaching comes with notable risks, particularly when it diminishes the interpersonal dimensions of instruction that are integral to effective language development. Language acquisition is fundamentally a social process, dependent on interaction, negotiation of meaning, and affective engagement between speakers, and AI systems are currently limited in their capacity to replicate these features of human communicative practice (Kukulska-Hulme & Viberg, 2018; Aliakbari & Mardani, 2022). Overreliance on AI-mediated practice may reduce learners' exposure to authentic conversational interaction, collaborative problem-solving, and the interpersonal dynamics that sustain motivation and build communicative competence over time. These concerns are particularly salient in large EFL classrooms where AI tools may be deployed as de facto replacements for teacher-student interaction rather than as complements to it.

The intersection of technology, rules, and teaching styles can further exacerbate disparities in learning outcomes. Learners with higher digital literacy, stronger self-regulation skills, and greater access to stable technology infrastructure are systematically advantaged in AI-mediated learning environments, while those with limited technological experience or weaker self-directed learning capacities may derive less benefit from AI tools, or may even experience increased disengagement (Mohebbi, 2025; Musabal & AbdAlgene, 2023; Shaalan, 2023; Ahmad & Alam, 2024; Alam, 2024). Policy frameworks that fail to address these structural disparities risk exacerbating existing educational inequities under the guise of technological progress.

Tackling these issues requires a balanced approach that combines robust infrastructure, enhances teacher skills, upholds ethical principles, and develops tailored educational policies. AI integration in Saudi EFL education must be understood not simply as a technological intervention but as a complex socio-educational transformation that requires sustained institutional commitment, culturally responsive design, and ongoing critical evaluation. Future policy frameworks should prioritize equitable access to AI resources, systematic teacher training, culturally adaptive AI development, and transparent governance structures that safeguard learner rights and promote educational justice.

Overall, the challenges identified across studies reveal an interconnected set of technological, pedagogical, and ethical constraints that collectively limit the transformative potential of AI in Saudi EFL classrooms. Addressing these challenges requires moving beyond isolated tool adoption toward the development of coherent, institutionally supported AI integration frameworks that account for the specific sociolinguistic, cultural, and infrastructural realities of Saudi language education.

8. Conclusion, Future Directions and Implications

Accordingly, this review demonstrates that artificial intelligence (AI) has begun to transform language education by providing measurable gains in writing quality, pronunciation accuracy, learner engagement, and self-regulated learning within Saudi EFL contexts. AI tools such as automated writing evaluation systems, speech-recognition applications, and adaptive learning platforms have demonstrated consistent effectiveness in supporting lower-order linguistic skill development, providing scalable and personalized feedback that extends the instructional reach of classroom teachers. However, the review also identifies significant constraints on AI's current contribution to higher-order communicative competencies, including pragmatic awareness, discourse coherence, and cross-cultural communicative adaptability, where human-mediated instruction remains indispensable.

Future studies on AI in language learning should focus on long-term research to determine its actual impact on language proficiency, especially in Saudi Arabia. Additional inquiry is needed into the sustained longitudinal effects of AI integration on language proficiency development, particularly across extended instructional periods that capture the cumulative impact of repeated AI-mediated practice. Comparative studies examining different types of AI tools, feedback modalities, and instructional configurations will also be essential for building an evidence base that can inform nuanced, context-specific recommendations for AI deployment in EFL settings (Yan & Lowell, 2025). Furthermore, research that centers the experiences and perceptions of learners from diverse sociolinguistic backgrounds will be critical for designing AI systems that are responsive to the cultural and linguistic realities of non-Western language learners.

Effective AI implementation necessitates alignment among technological infrastructure, pedagogical design, and institutional support systems. For educators, this review underscores the importance of developing critical AI literacies that extend beyond basic tool operation

to include the capacity to evaluate AI outputs, scaffold learner interactions with automated systems, and integrate AI-generated data into holistic assessment practices. For policymakers, the findings call for sustained investment in AI-focused professional development, equitable infrastructure provisioning, and the establishment of ethical governance frameworks that safeguard learner data and promote culturally responsive AI design. Collectively, these recommendations point toward a vision of AI integration that is not merely technologically driven but pedagogically purposeful, institutionally coherent, and ethically grounded in the values of inclusive, evidence-based language education.

Acknowledgement

“The authors extend their appreciation to Prince Sattam bin Abdulaziz University for funding this research work through the project number (PSAU/2025/02/37146)”

Authors Contributions

Dr. SA and Dr. FA were responsible for study design and revising. Dr. AOM, Dr. JD, DSO, Dr. TR was responsible for revising. All authors read and approved the final manuscript.

Funding

“The authors extend their appreciation to Prince Sattam Bin Abdulaziz University for funding this research work through the project number (PSAU/2025/02/37146)”

Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal’s policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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