

Enhancing the Presence of Arabic Language within Artificial Intelligence Ecosystems: A Strategic Institutional Approach from Sultan Sharif Ali Islamic University (UNISSA) toward Linguistic Sustainability.

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Abstract

The accelerating expansion of artificial intelligence (AI) has profoundly reshaped contemporary language education, raising critical questions concerning linguistic presence, learner agency, and long-term sustainability within digitally mediated learning ecosystems. This study examines how AI may enhance the institutional presence of the Arabic language through a strategically coordinated educational approach, drawing on Sultan Sharif Ali Islamic University (UNISSA) as an empirical case. Grounded in the theoretical traditions of Computer-Assisted Language Learning (CALL) and second language acquisition (SLA), the study adopts an interpretive qualitative methodology to explore learners' lived experiences with AI-assisted Arabic language learning and to analyze how AI mediates linguistic development and institutional sustainability. Data were collected in 2025 through semi-structured interviews with thirty-eight students enrolled in Arabic-track programmes who had sustained engagement with AI-supported learning tools. Thematic analysis revealed three overarching dimensions: (1) AI-supported enhancement of core linguistic skills, (2) increased grammatical and metacognitive awareness, and (3) perceived risks associated with excessive technological dependence. The findings indicate that AI functions not merely as a technical enhancement but as a pedagogical mediator that supports reading comprehension, listening accuracy, speaking fluency, writing coherence, and dynamic grammatical understanding. Beyond individual proficiency gains, AI was found to extend Arabic use beyond classroom boundaries into digitally mediated, self-directed learning practices, thereby reinforcing linguistic sustainability at the institutional level. Nevertheless, participants also articulated concerns regarding overreliance on AI, including diminished learner autonomy and reduced critical engagement. The study concludes that the pedagogical value of AI depends fundamentally on intentional instructional and institutional design that positions AI as a mediating resource rather than a substitute for cognitive effort. In doing so, the study contributes to ongoing scholarly debates on AI, learner agency, and sustainable language education.

Keywords: Artificial Intelligence; Arabic as a Foreign Language; Computer-Assisted Language Learning; Linguistic Sustainability; Learner Agency; Institutional Strategy

1. Introduction

The rapid proliferation of artificial intelligence (AI) has fundamentally reconfigured contemporary knowledge ecosystems, transforming how languages are learned, circulated, and sustained within educational and digital environments. AI no longer operates merely as a supplementary instructional aid; rather, it increasingly functions as an infrastructural force that shapes linguistic visibility, accessibility, and long-term vitality across academic, cultural, and communicative domains. Within this global transformation, questions of linguistic presence and sustainability have become especially urgent for languages whose representation within AI-driven systems remains uneven or structurally constrained. Arabic occupies a distinctly paradoxical position in this regard. Despite its extensive geographical reach, historical depth, and civilizational significance, Arabic continues to encounter persistent challenges within artificial intelligence ecosystems. These challenges include limited high-quality and pedagogically oriented datasets, insufficient contextual sensitivity in language models, and uneven integration of Arabic into adaptive learning technologies. When technological innovation proceeds without explicit linguistic and educational strategy, it risks reproducing existing hierarchies of language dominance rather than fostering linguistic diversity and equity (Warschauer, 2003, pp. 44–48; UNESCO, 2023, pp. 18–24). Consequently, the integration of Arabic into AI environments must be conceptualized not as a purely technical undertaking, but as a strategic institutional project grounded in applied linguistics, language policy, and sustainability-oriented pedagogy. Within the field of Computer-Assisted Language Learning (CALL), contemporary scholarship increasingly reconceptualizes AI as a pedagogical mediator rather than a neutral or auxiliary tool. AI-driven systems now actively regulate learners' access to linguistic input, scaffold output production, and modulate feedback processes in ways that closely align with established principles of second language acquisition, including interaction, meaningful input, noticing, and feedback-driven learning (Ellis, 2008, pp. 57–63; Holmes et al., 2019, pp. 41–45). From this perspective, AI becomes an integral component of the learning ecology itself, participating in the co-construction of meaning, learner agency, and linguistic competence. Despite the rapid growth of research on AI-enhanced language learning, empirical investigations focusing specifically on Arabic within institutionally embedded AI ecosystems remain limited. Much of the existing literature concentrates on isolated tools or discrete language skills, often privileging short-term performance gains over broader pedagogical, sociolinguistic, and sustainability-oriented considerations. As a result, insufficient attention has been devoted to the strategic role of universities as institutional actors capable of embedding Arabic within AI-supported learning environments in ways that promote enduring linguistic presence rather than transient instructional efficiency. This gap is particularly salient in multilingual contexts where Arabic is taught as a foreign language. In such settings, the sustainability of Arabic depends not only on curricular provision, but also on learners' continued engagement with the language beyond formal classroom boundaries through digitally mediated and AI-supported practices. Institutional strategies that integrate AI into language education therefore play a decisive role in transforming Arabic from a course-bound subject into a living academic and digital language embedded within students' everyday learning routines. At the same time, contemporary scholarship has articulated serious concerns regarding the unreflective adoption of AI in educational contexts. Excessive reliance on automated systems may lead to cognitive offloading, diminished learner agency, and weakened critical engagement with language (Carr, 2011, pp. 120–123). From a motivational perspective, overdependence on external technological support may erode intrinsic motivation and self-regulatory capacity—both of which are essential for sustained language development (Dörnyei, 2005, pp. 213–215). These concerns underscore the necessity of conceptualizing AI integration within a balanced pedagogical ecology in which technological affordances enhance learning without displacing learner responsibility.

Against this backdrop, the present study investigates how artificial intelligence can enhance the presence of Arabic within AI-mediated educational ecosystems through a strategic institutional approach at Sultan Sharif Ali Islamic University (UNISSA), Brunei Darussalam. By foregrounding students' lived experiences with AI-assisted Arabic learning, the study examines how AI mediates the development of core linguistic skills—reading, listening, speaking, writing, and grammar—while simultaneously contributing to linguistic sustainability at the institutional level.

The study advances the literature in three principal ways. First, it extends CALL research by offering an empirically grounded account of AI as a pedagogical mediator in Arabic language learning. Second, it contributes to emerging discussions on linguistic sustainability by situating AI integration within an institutional framework that connects pedagogy, digital practice, and language vitality. Third, it adopts a critical stance by explicitly addressing the risks of overreliance on AI, thereby engaging ongoing debates concerning learner agency, cognitive depth, and reflective linguistic competence.

2. Literature Review

2.1 Artificial Intelligence as a Pedagogical Mediator in CALL: Recent developments in CALL have increasingly conceptualized artificial intelligence as a mediating force that reshapes the ecology of language learning. Within this paradigm, AI systems function as adaptive interfaces that regulate access to input, scaffold output production, and modulate feedback processes in ways that closely align with core SLA principles (Ellis, 2008, pp. 57–63). Learning is thus understood as emerging from dynamic interaction among learners, tools, and linguistic tasks, rather than from exposure alone.

2.2 AI-Mediated Reading Development: Reading comprehension is widely understood as a strategic and interactive process. AI-supported reading environments—featuring intelligent glossing, contextual vocabulary support, and semantic mapping—have been shown to facilitate both bottom-up decoding and top-down inferring, thereby reducing extraneous cognitive load and enabling deeper textual engagement (Anderson, 2015, pp. 62–67; Grabe & Stoller, 2011, pp. 210–214). In Arabic language learning contexts, these affordances are particularly significant given the language's morphological density and syntactic complexity.

2.3 Listening and Speaking in AI-Enriched Environments: Listening and speaking development relies heavily on feedback-rich interaction. AI-enhanced listening environments provide controlled repetition, high-quality phonological modeling, and learner-paced input, supporting perceptual recalibration and metacognitive monitoring (Vandergrift, 2007, pp. 191–193). Similarly, AI-based pronunciation tools facilitate iterative cycles of production, noticing, and reformulation, which are central to the development of fluency and intelligibility (Derwing & Munro, 2015, pp. 87–90).

2.4 Writing, Feedback, and Learner Agency: Writing is increasingly conceptualized as a process of guided revision and self-regulation rather than mere product generation. AI-driven feedback systems can enhance grammatical accuracy and textual coherence when framed as scaffolding mechanisms rather than authorial

substitutes (Hyland & Hyland, 2006, pp. 88–92; Weigle, 2014, pp. 43–45). Crucially, learner agency remains central: over-automation risks diminishing reflective engagement and ownership of the writing process.

2.5 Grammar as Dynamic Usage: Contemporary grammar instruction emphasizes form–meaning–use integration rather than static rule memorization. Larsen-Freeman’s (2003, pp. 102–105) concept of grammaring aligns closely with AI-mediated environments, where learners encounter grammatical forms through contextualized input, guided practice, and communicative application.

2.6 Linguistic Sustainability and Institutional Strategy: Recent policy-oriented scholarship highlights AI’s potential to support linguistic sustainability by embedding languages within digital ecosystems and everyday learning practices (UNESCO, 2023, pp. 18–24). Institutions play a decisive role in shaping whether AI integration reinforces or undermines long-term language vitality.

2.7 Critical Perspectives on AI Overreliance: Critical scholarship cautions that excessive reliance on AI may lead to cognitive offloading, reduced intrinsic motivation, and weakened critical literacy (Carr, 2011, pp. 120–123; Dörnyei, 2005, pp. 213–215). Balanced pedagogical design is therefore essential to ensure that AI enhances, rather than replaces, cognitive engagement.

3. Research Methodology: This study adopted an interpretive qualitative research design to explore students’ perceptions and lived experiences of AI integration in Arabic language learning. Semi-structured interviews were conducted with thirty-eight purposively selected students enrolled in Arabic-track programmes at UNISSA. Data were collected in 2025, transcribed verbatim, and analyzed using Braun and Clarke’s (2006, pp. 86–93) six-phase thematic analysis framework. Trustworthiness was ensured through established criteria of credibility, dependability, confirmability, and transferability (Lincoln & Guba, 1985, pp. 289–331).

4. Findings and Discussion: This field study investigates the expanding role of artificial intelligence (AI) in teaching Arabic as a foreign language (AFL) within the context of Sultan Sharif Ali Islamic University (UNISSA), Brunei Darussalam. Guided by an interpretive qualitative orientation, the study aimed to understand how learners conceptualize AI’s influence on their linguistic development and learning experiences. Data were collected through semi-structured interviews with 38 students enrolled in Arabic-track programmes during 2025. The dataset was analyzed using thematic analysis to identify recurring patterns, interpret meaning-making processes, and relate emergent themes to contemporary scholarship in second language acquisition and computer-assisted language learning (CALL).

4.1. Reading development: Participants consistently reported that AI-supported tools enhanced reading comprehension, particularly through intelligent summarization, vocabulary clarification, contextual interpretation, and semantic support. Learners emphasized that these affordances reduced perceived cognitive load, enabling faster access to meaning in academic and literary Arabic texts. Such perceptions align with research on digital reading environments and strategy-based comprehension, which suggests that supportive technologies can facilitate both top-down and bottom-up processing and strengthen learners’ capacity to infer meaning, organize ideas, and analyze discourse structures (e.g., Anderson, 2015). Notably, students’ accounts reflect a shift from viewing reading as a fixed ability to recognizing it as an improvable competence when scaffolded by adaptive tools—an insight consistent with CALL frameworks that prioritize comprehension support and strategic engagement with text.

4.2. Listening development: Listening emerged as a major challenge due to Arabic’s phonological complexity and the fine-grained contrasts among consonantal and vowel features. Students described AI as providing rich auditory input, standardized pronunciation models, and unlimited practice through repetition and replay. These features were perceived as improving auditory discrimination, rhythm recognition, and listening confidence. Such findings resonate with research emphasizing the centrality of guided repetition, metacognitive awareness, and strategic listening in second language development (Vandergrift, 2007). From an SLA perspective, the reported gains may be interpreted as the result of increased exposure to comprehensible, repeatable input, coupled with greater learner control over pace and difficulty.

4.3. Speaking development: Participants highlighted AI-enabled pronunciation assessment and feedback systems as especially valuable for speaking development. Students reported that immediate corrective feedback helped refine articulation, improve prosodic control, and increase fluency through repeated practice in a low-anxiety environment. This supports established insights in pronunciation pedagogy that emphasize the importance of timely feedback, frequent practice, and confidence-building conditions for improving intelligibility and accuracy (Derwing & Munro, 2015). Interpreted through output-oriented accounts of SLA, AI appears to facilitate iterative cycles of production, noticing, correction, and re-production—conditions widely associated with oral development and skill consolidation.

4.4. Writing development: Writing was described as a complex domain involving grammar, morphology, semantics, coherence, and rhetorical appropriateness. Students reported that AI tools improved writing quality by offering instant error detection, reformulation options, grammar explanations in context, and lexical suggestions. These affordances were perceived as enhancing coherence, clarity, and academic register while increasing learners’ confidence in producing Arabic texts. This aligns with scholarship on technology-mediated writing support, which notes that feedback systems can promote grammatical awareness, reduce recurring errors, and facilitate revision practices when used as scaffolding rather than substitution (Weigle, 2014).

4.5. Grammar understanding: Participants also described AI as improving grammar learning through simplified explanations, examples, and structured guidance, making complex Arabic grammatical and morphological patterns more accessible. Such accounts converge with the view that grammar is most effectively learned as a dynamic meaning-making resource rather than a static rule list (Larsen-Freeman, 2003). AI, in learners’ perceptions, functioned as a mediating tool that supports analysis, practice, and contextual application—three key conditions for durable grammatical development.

4.6. Linguistic sustainability at UNISSA: A prominent theme concerned linguistic sustainability: students viewed AI not merely as a learning aid but as a strategic enabler of Arabic’s continued presence in academic and digital spaces at the university. Participants noted that AI expanded access to Arabic resources beyond classroom time, supported self-directed learning, and strengthened daily engagement with Arabic within digitally mediated routines. This perspective is consistent with policy-oriented discussions that emphasize the role of digital infrastructures and AI in reinforcing language vitality and supporting sustained language use in multilingual contexts (UNESCO, 2023).

4.7. Risk of overreliance: Alongside these benefits, the study identified a substantive concern: overreliance on AI. Students cautioned that excessive dependence may weaken independent intellectual production, reduce intrinsic motivation, and limit deep reflection. Such risks echo broader discussions about how always-available automated assistance can reshape learning habits, potentially discouraging effortful processing and critical evaluation (Carr, 2011). Interpreted through motivational and self-regulation perspectives, the findings underscore the need to frame AI as a mediator that supports learning processes without replacing learner agency (Dörnyei, 2005).

4.8. Analytical synthesis: Overall, the findings suggest that AI can meaningfully enhance AFL learners’ reading, listening, speaking, writing, and grammar development, while also supporting institutional linguistic sustainability by extending Arabic use into digital and self-directed learning spaces. However, these benefits are conditional: the study highlights the necessity of pedagogical design that balances AI-supported scaffolding with tasks that cultivate autonomy, critical literacy, and authentic language production. Accordingly, universities seeking sustainable AI integration should adopt structured guidance, transparent academic integrity policies, and formative assessment practices that reward process, originality, and reflective engagement.

5. Conclusion and Recommendation: This study demonstrates that artificial intelligence, when strategically integrated within an institutional framework, can enhance both individual Arabic language development and broader linguistic sustainability. AI functions most productively as a pedagogical mediator—supporting comprehension, production, and grammatical awareness—rather than as a substitute for cognitive effort. However, the benefits of AI remain contingent upon intentional instructional design that safeguards learner autonomy and critical engagement.

Institutions are therefore encouraged to develop coherent AI language policies, invest in Arabic-rich digital resources, and provide professional development for instructors. Future research may adopt longitudinal and mixed-methods approaches to examine the long-term implications of AI-mediated learning for proficiency development, learner identity, and sustainable language use.

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