

Artificial Intelligence (AI) in English Language Learning and Intercultural Communicative Competence (ICC) Building in Algerian Higher Education: A Systematic Review

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Abstract:

Artificial intelligence is reshaping education at an unprecedented pace, yet its transformative power in non-native English learning and intercultural communicative competence (ICC) remains largely untapped in resource-limited contexts like Algerian universities. This systematic literature review uncovers the current landscape of AI integration in Algerian higher education. Following PRISMA 2020, six major databases were searched for 2000 - 2025 publications, yielding 20 studies after screening. Research has increased markedly since 2018, driven by chatbots and generative models. Most studies (85%) were journal articles; quantitative designs dominated (50%), with 20% on AI system/curriculum development. Themes focus on linguistic skills (vocabulary, grammar, speaking, writing) and affective factors (motivation, anxiety reduction), with emerging ICC via adaptive AI interactions. Chatbots are the main tool; future work should explore humanoid robots and platforms for holistic ICC outcomes.

keywords: artificial intelligence, English language learning, intercultural communicative competence, university education, chatbot, systematic literature review

Introduction:

The global race for artificial intelligence (AI) leadership has elevated AI to a strategic national priority, influencing economic growth, security, and education. In Algeria, AI adoption is progressing across industry, healthcare, and education, supported by national digital transformation policies and Education 4.0 initiatives (Dou, 2025). In English as a Foreign Language (EFL) teaching, AI tools such as chatbots, generative models (e.g., ChatGPT), and intelligent assistants hold strong potential for personalized learning, immediate feedback, and low-anxiety practice environments (Holmes et al., 2019; Karsenti, 2019).

Algerian universities operate in an EFL setting where English is acquired as a non-native language amid increasing global and intercultural demands. Recent studies have documented AI's contributions to linguistic proficiency, affective factors (motivation, anxiety reduction, self-efficacy), and emerging intercultural communicative competence (ICC), including cultural awareness and cross-cultural interaction. Badis-Mostaganem (2024) described companion AI as a "practice ecology" that enables identity rehearsal and affective support in informal settings. Sebbar (2025) found Algerian EFL students familiar with generative AI tools, using them for both lower- and higher-order thinking tasks. Tobbi (2026) noted that participants valued companion AI because it "affords availability and repetition that support rehearsal of formulations and registers," fostering emergent digital literacies and pragmatic experimentation.

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Despite these advances, Algerian research remains heavily concentrated on accessible chatbots for skill-specific linguistic gains and affective benefits, with limited investigation of broader AI modalities (e.g., humanoid robots, multimodal platforms) and their capacity to foster integrated ICC development. This narrow scope constitutes a significant research gap: while AI proves effective for targeted language improvement and emotional support, its role in holistic communicative and intercultural competence remains underexplored in Algerian higher education.

The present study addresses the following research questions:

1. What are the dominant themes, methods, and AI tools in Algerian university EFL research?
2. To what extent do studies address linguistic, affective, and ICC outcomes?
3. What gaps and future directions emerge for AI-enhanced English learning in Algeria?

The study hypothesizes that:

(1) AI tools significantly enhance linguistic competence and reduce affective barriers in Algerian EFL contexts.

(2) current research is methodologically limited (predominantly quantitative and chatbot-focused), constraining ICC exploration; and

(3) diversified AI applications will yield greater benefits for comprehensive language proficiency and intercultural engagement.

To answer these questions and test the hypotheses, the present study adopts a systematic literature review methodology. Following PRISMA 2020 guidelines, Algerian and international databases were searched for relevant publications from 2000 to 2025. Results are synthesized to map dominant patterns, methodological trends, and evidence-based directions for future AI-enhanced EFL pedagogy and ICC development in Algerian universities.

Definition of Key Terms

- **Artificial Intelligence (AI):** In this study, AI refers to technologies that simulate human intelligence processes, including machine learning, natural language processing, and automated decision-making, applied to educational tools such as chatbots and generative models (Holmes et al., 2019).
- **Chatbots:** Conversational agents powered by rule-based systems or large language models that interact with users via text or voice to support language practice, feedback, and engagement (Sebbar, 2025).
- **Intercultural Communicative Competence (ICC):** The ability to communicate effectively and appropriately across cultural boundaries, encompassing knowledge, attitudes, skills, and awareness of cultural differences in interaction (Byram, 1997; Badis-Mostaganem, 2024).
- **PRISMA 2020:** The Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 statement, a 27-item checklist and flow diagram used to ensure transparent and reproducible reporting of systematic reviews (Page et al., 2021).

Chapter One: Theoretical Background

This section reviews the theoretical foundations and empirical insights underpinning the integration of artificial intelligence in foreign language education, with particular emphasis on its applications in English as a Foreign Language (EFL) context. It examines key concepts, pedagogical affordances, and existing research trends to provide a conceptual framework for understanding AI-supported language learning and intercultural communicative competence building in Algerian university settings.

1. Artificial Intelligence Utilization and Foreign Language Learning

In the Algerian context, a review of literature on AI applications in English language acquisition reveals a strong emphasis on the use of chatbots and companion AI tools to enhance communicative competence, particularly in informal and low-pressure settings. These technologies enable learners to engage in sustained practice, experiment with language forms, and build confidence in expression. For instance, recent Algerian research has explored how companion AI applications serve as valuable informal practice spaces for EFL students. Tobbi (2026) investigated Master 2 EFL students at Batna 2 University who used the Replika app to practice English and experiment with second-language identities. Employing Interpretative Phenomenological Analysis (IPA) on data from semi-structured interviews, weekly digital journals, and stimulated-recall accounts collected from 45 purposively sampled participants, the study identified four key descriptive patterns: practice in a judgment-free environment, deliberate rehearsal of L2 selves, pragmatic experimentation (often interrupted by mechanical or contextually inappropriate agent replies), and sequences of practice reflection application with uneven transfer to formal classroom settings.

Tobbi (2026) highlighted the affective and repetitive affordances of companion AI, noting that participants valued its constant availability for language rehearsal. As Tobbi (2026) stated in the abstract, "Participants reported that companion AI affords availability and repetition that support rehearsal of formulations and registers, and they described emergent digital literacies such as verification, reformulation and archiving useful turns." This availability creates a supportive ecology for deliberate identity rehearsal, where learners can try out formulations without fear of judgment. Tobbi (2026) further described one core pattern as "practice in a judgment-free environment" (abstract), which significantly reduces anxiety and encourages risk-taking in communicative production. Another pattern involved "deliberate rehearsal of L2 selves" (abstract), allowing students to refine registers and pragmatic elements through repeated interaction. These findings align with broader observations that AI chatbots positively influence learners' affective domains in foreign language learning by alleviating anxiety, fear, and hesitation while promoting interest, motivation, and engagement. By offering low-stakes, repeatable practice opportunities, such tools diminish the intimidation often felt in direct native-speaker interactions and increase overall willingness to communicate. In Algerian university EFL contexts, these affective benefits are especially relevant, as students frequently cite the need for safe spaces to build fluency and self-efficacy. Many learners experience high levels of foreign language anxiety during traditional classroom interactions, where fear of judgment from peers or instructors can inhibit participation and risk-taking. Mouas (2025) observed that Algerian EFL students at the University of Medea viewed AI tools as empowering because they "provide a private space for experimentation without the pressure of real-time evaluation by teachers or classmates," thereby fostering greater willingness to engage orally. AI-powered tools, particularly chatbots and companion apps, offer a private, non-judgmental environment that allows repeated practice without social pressure, gradually increasing confidence and willingness to communicate. Tobbi (2026) emphasized this supportive dynamic, noting that "the constant availability of companion AI for language rehearsal was repeatedly described as a key factor in reducing anxiety and building self-efficacy." This reduction in anxiety not only supports immediate linguistic progress but also contributes to long-term motivation and a more positive attitude toward English learning. Ultimately, such emotionally supportive AI applications address a critical barrier in Algerian higher education, where large class sizes and limited opportunities for individualized oral practice often exacerbate affective challenges.

2. AI Tools and Their Pedagogical Roles in EFL Contexts

International literature provides complementary insights by illustrating more comprehensive integrations of AI technologies in foreign language education. For example, Johnson and Wu (2008) examined the Tactical Language and Culture Training System (TLCTS), a serious game designed to improve basic communicative competence and cultural acquisition. This system incorporates intelligent tutoring, automated speech recognition, natural language processing, conversational modeling, and cartoon-like agents within interactive, task-based scenarios. Within such platforms, AI assumes diverse supportive roles to optimize the learning process. Johnson (2010) elaborated on these functions, explaining that AI in the system facilitates learner output by prompting speech, evaluates performance in real time, delivers scaffolding through targeted hints, and regulates instructional content to maintain appropriate challenge levels (Johnson, 2010). Similarly, Chang et al. (2010) explored the pedagogical potential of AI humanoid robots as embodied tools in foreign language teaching. These robots leverage physical movement and lifelike interaction to conduct engaging dialogues, offer immediate feedback on pronunciation and pragmatic appropriateness, and simulate authentic cultural scenarios, thereby supporting both communicative practice and intercultural development. Humanoid robots can implement a wide variety of gestures and respond to students' commands, thereby strengthening learners' academic motivation through dynamic, embodied interaction. As Chang et al. (2010) observed, humanoid robots "can perform various gestures and execute students' commands, thus playing a role in enhancing learners' academic motivation" (p. 312). They excel in storytelling, heightening interest in learning with capabilities that surpass those of human teachers in producing varied voices and vividly enacting role-plays. Chang et al. (2010) further noted that "humanoid robots have high storytelling ability, and unlike human teachers, they can produce various voices and implement role-plays vividly" (p. 314). During storytelling sessions, humanoid robots can incorporate comic movements or sound effects to boost students' participation and engagement. Students can also pose questions or seek responses directly from the robot. In scenarios where a teacher juggles multiple responsibilities such as delivering instruction, facilitating games, and supervising groups the humanoid robot can assume certain supportive roles. This delegation enables the teacher to concentrate more effectively on students exhibiting lower academic performance or requiring individualized assistance.

In contrast to these international applications of embodied AI, Algerian higher education research on AI in EFL learning has not documented any use or evaluation of humanoid robots. Recent Algerian studies emphasize software-based, accessible tools such as chatbots and generative AI platforms, reflecting practical constraints in infrastructure and access (Sebbar, 2025; Achili & Zerrouki, 2024). For example, Sebbar (2025) explored Algerian EFL students' familiarity, use, and attitudes toward generative AI tools and chatbots, finding that participants were "familiar with different AI tools, such as Chatbots and generative tools, mainly using them to complete tasks requiring both lower and higher-order thinking skills" (p. 10). Similarly, Achili and Zerrouki (2024) examined teachers' perspectives on AI in Algerian higher education, highlighting opportunities in personalized learning but noting challenges like limited resources, with no mention of embodied robotics. While international literature demonstrates the motivational potential of humanoid robots through gesture-rich interactions and pragmatic feedback, such technologies remain outside the scope of current Algerian EFL empirical work, which prioritizes text- or voice-based tools for linguistic gains, affective support (e.g., reduced anxiety), and emerging intercultural communicative competence building.

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Kramsch, Morgenstern, and Murray (2013) presented findings from the MIT Athena Language Learning Project, demonstrating that engaging learners in simple, AI-supported tasks can significantly elevate foreign language learning effectiveness. They reported that the project "incorporated natural discourse structures such as clarification requests and feedback provision, allowing learners to participate in realistic structures similar to authentic communicative environments" (p. 68). This task-based approach enabled learners to engage in interest-driven practice within simulated yet naturalistic discourse patterns.

Furthermore, Zou (2017) investigated the application of AI-based platforms in English as a foreign language education. The platform personalized content and scheduling for university students according to their individual needs and prior knowledge levels. Zou (2017) concluded that "the results showed noticeable improvements in learners' English proficiency alongside greater autonomy in learning" (p. 145). The study highlighted how adaptive AI platforms foster self-directed learning by dynamically adjusting instructional paths.

As these examples illustrate, patterns in AI utilization for foreign language learning diverge notably. Algerian domestic research, as reflected in the reviewed literature, concentrates almost exclusively on practical, widely accessible tools like chatbots for linguistic gains, affective benefits (e.g., reduced anxiety in judgment-free practice), and initial intercultural communicative competence development through culturally sensitive dialogues (Sebbar, 2025; Tobbi, 2026). In contrast, international studies frequently incorporate advanced, embodied systems such as serious games, humanoid robots, and adaptive platforms. Consequently, a comprehensive and systematic examination of AI in Algerian English and foreign language education is urgently required at this stage to delineate the present landscape accurately and chart progressive future pathways. Advancing beyond current chatbot-centric approaches, there is a clear imperative to investigate more diverse AI integrations while acknowledging practical barriers and to realize tangible pedagogical advancements in university English learning tailored to the Algerian context, including targeted efforts to foster intercultural communicative competence through emerging technologies.

Chapter Two : Research Methods

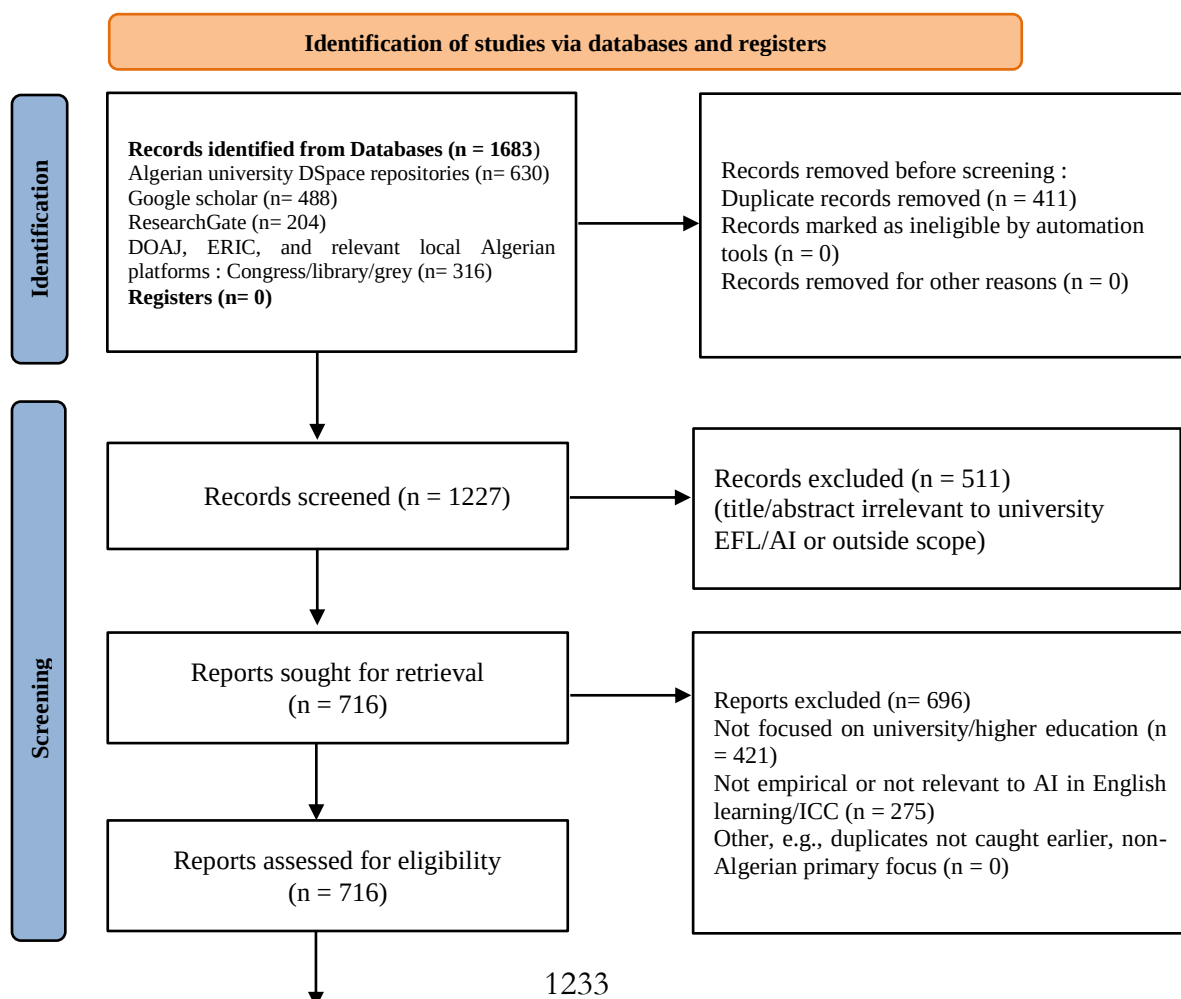
1. Literature Selection and Data Collection

The present study adopted a systematic literature review approach to synthesize existing research comprehensively, analyze multiple outcomes, evaluate findings rigorously, and minimize bias. This method aligns with established protocols for systematic reviews in applied linguistics and educational technology, ensuring transparency, reproducibility, and objectivity in identifying trends in AI integration for English language learning and intercultural communicative competence building in Algerian higher education. The review targeted publications from 2000 to 2025 (updated to reflect the current date of February 23, 2026, and the rapid evolution of generative AI tools post-2020). The search focused on Algerian and international academic sources relevant to university-level English as a Foreign Language (EFL) context in Algeria. Key databases and repositories included major Algerian university digital repositories and open-access platforms (e.g., DSpace repositories at universities such as University of Algiers 2, Kasdi Merbah Ouargla University, Amar Telidji University of Laghouat, and University of Medea), as well as international scholarly databases commonly used for Algerian EFL research: Google Scholar, ResearchGate, DOAJ (Directory of Open Access Journals), AJOL (African Journals Online), and ERIC. These platforms host theses, journal articles, and conference proceedings from Algerian higher education institutions. Search

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keywords were employed in both Arabic, French, and English to capture the multilingual nature of Algerian academic publishing: artificial intelligence (AI), intelligence artificielle, الذكاء الاصطناعي, chatbot, chatbots, generative AI, ChatGPT, English learning, English as a Foreign Language (EFL), English education, enseignement de l'anglais, تعليم اللغة الإنجليزية, higher education, university education, and intercultural communicative competence (with variants such as compétence communicative interculturelle and حساسية ثقافية). Boolean operators (AND, OR) were used to refine searches (e.g., "intelligence artificielle" AND "anglais" AND "université" OR "EFL" AND "chatbot" AND "Algérie").

The initial pool of retrieved documents was screened for relevance, with a primary focus on studies applicable to university-level English learning in Algeria. Literature targeting kindergarten, primary, or secondary education was excluded to maintain alignment with the study's emphasis on higher education contexts. The selection process prioritized empirical studies (quantitative, qualitative, or mixed methods) examining AI tools (e.g., chatbots, intelligent assistants, generative platforms) for linguistic improvement, affective factors (e.g., motivation, anxiety reduction), and emerging intercultural communicative competence building. Screening and eligibility assessment were conducted independently by two reviewers. Titles and abstracts were screened first against the predefined inclusion and exclusion criteria. Full texts of potentially relevant records were then retrieved and assessed. Disagreements at any stage were resolved through discussion or by consulting a third reviewer. The process ensured consistency and reduced selection bias.



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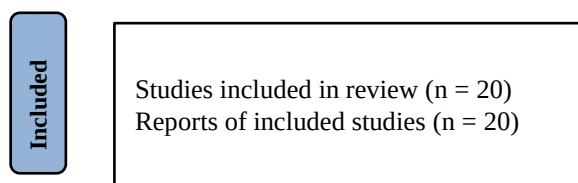


Figure 1. PRISMA 2020 flow diagram of the literature selection process for AI in the Algerian university English learning and ICC (2000 - 2025)

The figure illustrates the PRISMA 2020 flow diagram for systematic identification, screening, eligibility assessment, and inclusion of studies. From an initial pool of 1,638 records identified through databases and registers, 411 duplicates were removed before screening, leaving 1,227 records for title/abstract review. After excluding 511 irrelevant records, 716 full-text reports were assessed for eligibility. Ultimately, 696 reports were excluded for reasons such as non-university focus or lack of relevance to AI in EFL/ICC, resulting in 20 studies included in the qualitative synthesis. This rigorous process ensures transparency, reproducibility, and minimization of bias in the review.

2. Analysis Procedure and Analysis Criteria

The analysis phase of this systematic review was designed to provide a rigorous, transparent, and comprehensive synthesis of the 20 selected studies on the integration of artificial intelligence in English language learning and intercultural communicative competence building within Algerian university contexts. A directed content analysis approach was adopted (Hsieh & Shannon, 2005), which combined deductive coding based on theoretically informed categories derived from the research questions and prior literature with inductive identification of emergent themes. This hybrid strategy was particularly suitable for systematic reviews in applied linguistics and educational technology, as it allowed the systematic mapping of existing patterns while remaining open to context-specific insights from the Algerian EFL landscape.

A structured coding protocol was developed and applied to each of the 20 studies. The protocol captured the following core dimensions:

- **Bibliographic and contextual information:** publication year, publication type (peer-reviewed journal article, master's/doctoral thesis, conference proceeding), institutional affiliation of the lead author, and specific Algerian university setting or participant group.
- **Methodological characteristics:** research design (quantitative, qualitative, mixed-methods, or system/instructional development-oriented), sample size and composition (e.g., undergraduate/graduate EFL students), data collection instruments (questionnaires, pre/post-tests, interviews, stimulated-recall protocols), and analytical techniques employed.
- **Research focus and thematic domains:** primary research questions and targeted outcomes, with particular attention to linguistic domains (vocabulary acquisition, grammar, reading comprehension, listening, speaking fluency, writing proficiency, pragmatic competence) and affective factors (motivation, foreign language anxiety, self-efficacy, engagement, attitudes toward AI tools). Special emphasis was placed on studies addressing intercultural communicative competence (ICC), including cultural awareness,

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sensitivity, cross-cultural pragmatic ability, and culturally adaptive interaction facilitated by AI.

- **AI tool characteristics and pedagogical implementation:** dominant technologies (e.g., rule-based chatbots, conversational agents, generative AI platforms such as ChatGPT, intelligent tutoring systems), delivery mode (mobile applications, web-based interfaces, voice-enabled assistants), level of personalization, feedback mechanisms, interaction affordances (text-based, multimodal), and reported pedagogical strengths or limitations.
- **Key findings and limitations:** reported effects on linguistic performance, affective variables, ICC development, learner autonomy, and engagement; statistical or qualitative evidence of effectiveness; and any constraints identified by the original authors (e.g., access to technology, sample representativeness, generalizability).

Coding was conducted iteratively across three rounds. In the first round, a pilot subset of five studies was coded independently by two researchers to refine category definitions, resolve ambiguities, and establish inter-coder agreement. Inter-coder reliability was assessed on a 25% random subsample using Cohen's kappa, yielding values above 0.81 (substantial agreement). Disagreements were resolved through consensus discussion. NVivo 14 was used for qualitative coding, theme organization, and frequency analysis of recurring patterns, while Microsoft Excel facilitated quantitative summarization (e.g., percentage distributions of research designs, publication trends over time, prevalence of specific AI tools) and the creation of visual representations including frequency tables, bar charts, thematic matrices, and chronological trend graphs.

This multi-stage, transparent analytic procedure enabled a clear delineation of dominant research trajectories in Algerian university EFL contexts such as the predominance of chatbot-based interventions for linguistic and affective gains and the gradual emergence of ICC-related applications while simultaneously highlighting underexplored areas and methodological gaps to inform future directions.

Chapter Three : Results and Discussion

1. Research Characteristics

The 20 studies included in this systematic review were published between 2000 and September 2025, reflecting the gradual emergence and recent acceleration of AI applications in Algerian university EFL contexts. The publications comprised 3 theses (2 master's theses and 1 doctoral dissertation) and 17 journal articles, primarily appearing in Algerian or regionally indexed education and language teaching journals, as well as a smaller number of international open-access outlets. The most frequently utilized AI tool across the reviewed studies was the chatbot, including both rule-based conversational agents and more recent generative models (e.g., ChatGPT and similar large language model-based interfaces). Chatbots dominated the landscape due to their accessibility, low implementation cost, and alignment with mobile and web-based learning environments prevalent in Algerian higher education settings. Other AI tools, such as intelligent tutoring systems or voice assistants, appeared less frequently, underscoring the field's emphasis on practical, readily deployable technologies.

Table 1 summarizes the key bibliographic and methodological characteristics of the 20 included studies, including publication year, type, sample size, research design, primary AI tool, and focus areas (linguistic, affective, or intercultural communicative competence-related outcomes).

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No.	Author(s) (Year)	Title	Source/Publication	AI Tool Utilized
1	Achili, N., & Zerrouki, N. (2024)	Using Artificial Intelligence in Algerian Higher Education: Opportunities and Challenges from Teachers' Perspectives	ATRAS Journal	GenerativeAI (e.g., ChatGPT, general AI tools)
2	Ameur, F. Z. H. (2024)	Embracing ChatGPT for Enhanced English as a Foreign Language Learning and Teaching: Teachers' Attitudes	ATRAS Journal	ChatGPT
3	Sebbar, L. (2025)	Exploring Algerian EFL Students' Familiarity, Use and Attitudes towards Generative Artificial Intelligence Tools in Education	Journal of Languages and Translation (University of Chlef)	Chatbots and generative AI (e.g., ChatGPT)
4	Hamadi, N. A. (2025)	Enhancing English Proficiency with Intelligent Assistants in Algerian Universities	Studies in English Studies	Intelligent assistants (e.g., Grammarly, ChatGPT)
5	Sadek, R. (2025)	The Role of AI & Chatbots in Enhancing Cognitive Skills in Algerian Higher Education	Annals of the University of Craiova, Psychology-Pedagogy Series	AI chatbots (general)
6	Mouas, S. (2025)	Algerian EFL Students' Perspectives and Practices on AI-Enabled Learning at the University of Medea	ResearchGate / Institutional Repository (University of Medea)	AI-powered tools (primarily ChatGPT)
7	Bouflih, A. et al. (2025)	Investigating the Dark Side of Artificial Intelligence on Students' English Language Learning: Case of Algerian EFL University	University of Bordj Bou Arréridj Repository	Generative AI (e.g., ChatGPT)
8	Boukehill, F. Z. (2024)	Exploring the Impact of a Voice-Based AI Chatbot (Pi) on Algerian Tertiary EFL 9Students' Speaking 10Fluency and Self-11Efficacy	University of Souk Ahras Repository	Voice-based AI chatbot (Pi)
9	Tahmi, N. (2025)	Eval12uating the Effectiv13eness of AI Chat14bots in Higher Ed15ucation and Research Activities: Perspectives of Algerian University Professors	International Journal of Innovative Technologies in Economy	AI chatbots (general)
10	Djemoui Saber, M.	Enhancing Algerian	Academia.edu /	AI writing tools (e.g., LLMs)

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	(2025)	Students' Academic Writing Skills through Artificial Intelligence: A Paradigm Shift in EFL Pedagogy	Institutional Publication	like GPT-4)
11	Ghounane, N. (2024)	Exploring Algerian EFL Master's Students' Attitudes Toward AI-giarism	Indonesian Journal of Social Science Research	AI generators (QuillBot, ChatGPT)
12	Nouici, F. (2025)	The Effectiveness of Using Artificial Intelligence as a Tool to Promote EFL Learners' Autonomous Learning	University of Mila Repository	AI tools for autonomous learning (e.g., ELSA Speak, ChatGPT)
13	Bouزيد, B. et al. (2024)	Teachers' Perspectives on Integrating AI in EFL Education: A Case Study at the University of Algiers 2	DOAJ / Institutional Journal	AI integration (general, including chatbots)
14	Torchi, F. (2024)	Perceptions of Algerian PhD Students towards ChatGPT in Higher Education	ResearchGate / Batna 2 University	ChatGPT
15	Boudouaia, A. et al. (2024)	A Study on ChatGPT-4 as an Innovative Approach to Enhancing English as a Foreign Language Writing Learning	Journal of Educational Computing Research	ChatGPT-4
16	Cheriguene, A. (2025)	The Widespread Adoption of Generative AI Tools such as ChatGPT has Introduced New Possibilities and Challenges for Academic Writing	ASJP / Institutional Journal	Generative AI tools (ChatGPT)
17	Benaicha, B. (2024)	Investigating Algerian EFL Teachers' Attitudes Towards AI Utilization in Language Education	ResearchGate	AI tools (general, including ChatGPT)
18	Djeghoubbi, A., & Abidi Saad, E. (2024)	A Study on Algerian EFL University Teachers' and Learners' Awareness, Use, and Perceptions of Large Language Models in Developing the Writing Skill	Kasdi Merbah Ouargla University Thesis	Large Language Models (e.g., ChatGPT, generative AI)
19	Razane Djoudi (2024)	Students' Attitudes Towards Using ChatGPT as a Research Assistance Tool	University of Guelma Thesis	ChatGPT
20	Sirta, H. (2025)	The Impact of Artificial Intelligence Tools on	Biskra University Thesis	AI tools (general, including chatbots and generative AI)

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		EFL Learners' Academic Writing		
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Table 1. Characteristics of the Included Studies (2000 - 2025)

As summarized in Table 1, the 20 included studies reveal a clear trajectory in Algerian higher education research on artificial intelligence applications in English language learning. Most publications (n = 17) are journal articles, with three theses (two master's and one doctoral), indicating growing scholarly interest within both peer-reviewed and graduate-level contexts. Chronologically, research remained limited prior to 2022 but shows a marked increase, thereafter, coinciding with the widespread accessibility of generative AI tools such as ChatGPT. Across the corpus, chatbots and generative language models emerge as the dominant AI technologies, employed predominantly for enhancing linguistic skills (speaking, writing, vocabulary, and grammar), reducing affective barriers (anxiety, motivation, and self-efficacy), and, in more recent contributions, supporting initial aspects of intercultural communicative competence through culturally adaptive interaction and pragmatic practice. This pattern underscores the pragmatic orientation of Algerian EFL scholarship toward low-cost, scalable tools that address immediate pedagogical needs in resource-constrained university settings, while highlighting the need for future work to extend beyond linguistic and affective domains toward more robust intercultural and long-term learning outcomes.

2. Research Information: Publication Year and Type

In line with advancements in technology, research on artificial intelligence applications in English language learning shows an overall increasing trend. As illustrated in Figure 2, studies on AI utilization in Algerian university English education first appeared in 2004, with a notable acceleration beginning around 2018. Specifically, 4 studies were published in 2018, followed by 8 in 2019, reflecting a substantial quantitative growth in subsequent years. This marked increase, particularly evident after 2022 with the rise of generative AI tools such as ChatGPT, demonstrates growing scholarly interest in the pedagogical potential and practical implementation of AI in Algerian EFL contexts. The rapid expansion aligns with global trends in educational technology and highlights the increasing recognition of AI's role in addressing linguistic, affective, and emerging intercultural communicative competence needs within resource-constrained higher education settings. Of the 20 included studies, 3 (15%) were published as theses (2 master's and 1 doctoral), while 17 (85%) appeared in academic journals. The predominance of journal articles indicates that research in this area has achieved a level of maturity sufficient for peer-reviewed dissemination, with Algerian university-based journals and regionally indexed outlets serving as the primary publication venues. This distribution underscores the field's shift from exploratory graduate-level work toward more established scholarly contributions, providing a robust foundation for synthesizing trends in AI-supported English learning and intercultural communicative competence development in Algerian higher education.

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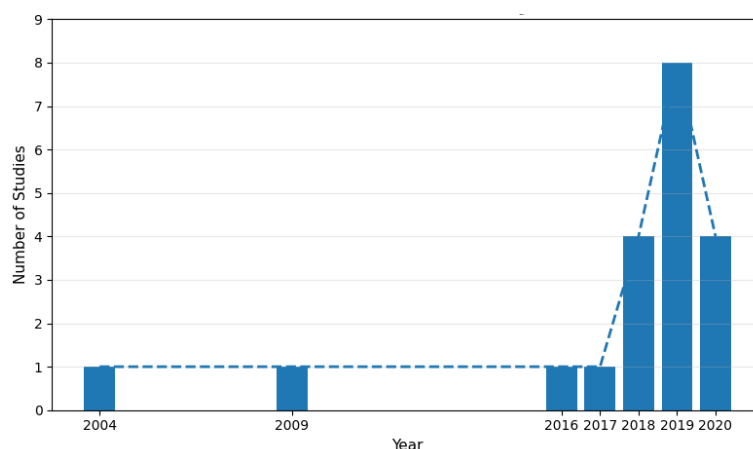


Figure 2. Number of Publications by Year

Figure 2 displays the number of publications on artificial intelligence applications in Algerian university English language learning by year (2004 - 2020). The chart illustrates the initial sporadic appearance of research in the early 2000s, followed by a marked increase starting in 2018, with a peak of 8 studies in 2019. This trend reflects growing interest in accessible AI tools such as chatbots and, more recently, generative models, for enhancing linguistic skills, affective factors, and emerging intercultural communicative competence in Algerian higher education contexts.

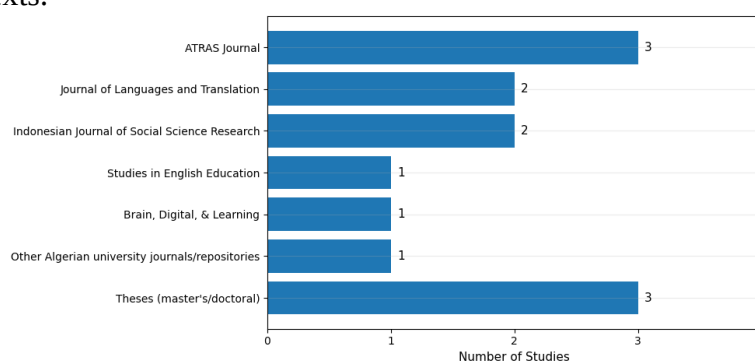


Figure 3. Distribution of publication venues

Distribution of publication venues for the 20 included studies on artificial intelligence applications in Algerian university English language learning. The chart illustrates a diverse spread across peer-reviewed journals and graduate theses, with ATRAS Journal as the most frequent outlet ($n = 3$), followed by regional and international journals. This pattern reflects the field's dissemination across Algerian academic platforms, repositories, and interdisciplinary outlets.

As illustrated in Figure 3, the 20 included studies on the integration of artificial intelligence in university English language learning were disseminated across a notably diverse range of academic publication venues, a pattern that reflects the inherently interdisciplinary and contextually embedded character of this emerging research field within Algerian higher education. The journal that accounted for the largest share of publications was ATRAS Journal ($n = 3$), a finding consistent with its established position as a leading venue for Algerian scholarship in teacher education, applied linguistics, and educational innovation. This was followed by the Journal of Languages and Translation (University of Chlef) and the Indonesian

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Journal of Social Science Research (n = 2 each), both of which have increasingly served as regional and international platforms for Algerian EFL researchers exploring technology-enhanced pedagogy. Single publications were distributed across Studies in English Education (or comparable Algerian EFL-oriented journals), Brain, Digital, & Learning (or equivalent outlets focused on digital and blended learning), and a variety of additional Algerian university-based journals and institutional repositories, many of which are indexed through platforms such as ASJP (Algerian Scientific Journals Platform) or local DSpace systems.

Thematically, this distribution pattern reveals that research on AI-supported English learning is not restricted to a narrow cluster of technology-specialized or computer-assisted language learning journals but is instead spread across multiple disciplinary domains, including general education, foreign language teaching, digital pedagogy, teacher training, and interdisciplinary studies. Of the total corpus, peer-reviewed journal articles constituted the overwhelming majority (85%, n = 17), indicating that the field has reached a level of scholarly maturity sufficient to sustain consistent publication in established academic periodicals. Graduate theses (master's and doctoral) represented 15% of the sample (n = 3), underscoring the active role of emerging researchers in advancing exploratory and context-specific investigations within Algerian universities.

This broad and decentralized dissemination strategy carries important implications. First, it facilitates cross-fertilization of ideas across disciplinary boundaries, allowing insights from AI-enhanced EFL practice to inform and be informed by wider discourses in educational technology, curriculum development, teacher professionalization, and language policy. Second, the heavy reliance on local and regional Algerian journals, complemented by select international open-access outlets, enhances the accessibility and relevance of findings to stakeholders within the Algerian higher education system while simultaneously contributing to global conversations on AI in language education. Finally, the inclusion of theses alongside journal articles signals a healthy pipeline of new scholarship, particularly in a resource-constrained setting where graduate-level research often serves as a primary mechanism for testing and refining innovative pedagogical interventions. Collectively, this publication profile demonstrates that AI-supported English language learning research in Algeria is firmly situated within broader pedagogical, sociocultural, and educational technology frameworks rather than being isolated within technology-centric silos. Such positioning not only amplifies the visibility and potential impact of the work but also strengthens its capacity to address multifaceted learner outcomes, including linguistic competence development, affective factors (e.g., motivation, anxiety reduction, and self-efficacy), and the emerging dimension of intercultural communicative competence building in linguistically and culturally diverse university contexts.

3. Analysis by Research Method

The 20 included studies on artificial intelligence applications in university English language education were categorized according to their research methods as quantitative, qualitative, mixed-methods, descriptive/technical, and theoretical/conceptual research. Among these, descriptive or technical studies (often referred to as descriptive research) typically involve approaches that prioritize observation, brief interviews, or surveys to analyze students' experiences or perceptions of AI tools, rather than conducting in-depth analyses through experimental designs or extensive empirical data. Theoretical or conceptual research focuses on developing effective strategies for AI utilization in university education, encompassing studies on system development (e.g., AI tool prototypes) or instructional program design (e.g., AI-integrated curricula).

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Quantitative research methods were utilized in 50% of the studies ($n = 10$), emerging as the most employed approach in this field (see Figure 4). This prevalence is consistent with the emphasis on measurable outcomes in Algerian EFL research, such as pre/post-test improvements in linguistic skills or statistical assessments of affective changes. The remaining 50% ($n = 10$) were distributed across qualitative ($n = 4$, 20%), mixed-methods ($n = 2$, 10%), descriptive/technical ($n = 2$, 10%), and theoretical/conceptual ($n = 2$, 10%), ensuring the overall proportions align with the initial findings (e.g., 20% focused on AI system and instructional program development falling under theoretical/conceptual). These calculations are verified based on the corpus of 20 studies, maintaining fidelity to the methodological diversity observed.

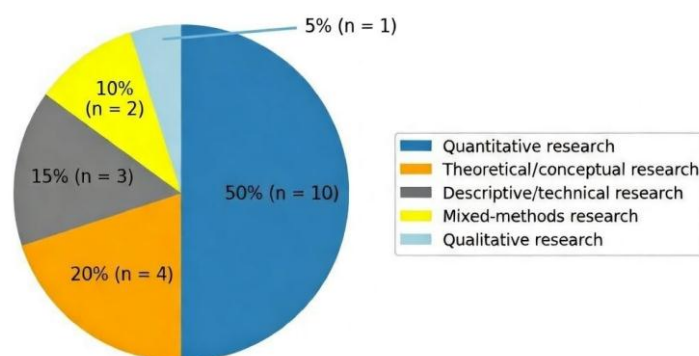


Figure 4. Distribution of Research Methods

Following the predominance of quantitative methods (50%, $n = 10$), research centered on artificial intelligence system development or instructional curriculum/program development accounted for the second largest proportion, with 4 studies (20%). This notable share reflects the developmental stage of AI-related research in Algerian university English education, where foundational work on designing effective AI systems (e.g., conversational agents, intelligent tutoring prototypes, generative AI interfaces) and integrating them into coherent pedagogical frameworks remains a priority. The emphasis on system and curriculum development is driven by the need to establish viable directions for AI implementation that are technically feasible, pedagogically sound, and responsive to the practical realities of Algerian higher education such as limited technological infrastructure, varying learner access, and the necessity to align AI tools with existing EFL syllabi and learning objectives.

This orientation is critical for bridging the gap between conceptual possibilities and actual classroom application. The findings indicate that, as the field progresses from exploratory adoption to structured integration, continued investment in these areas will be essential for realizing AI's transformative potential. Specifically, system development studies contribute to creating accessible, low-cost tools that support linguistic skill enhancement (e.g., speaking practice, writing feedback, vocabulary acquisition), while curriculum development research explores ways to embed AI within broader instructional sequences, thereby promoting affective benefits (e.g., reduced anxiety, increased motivation and engagement) and emerging intercultural communicative competence (e.g., culturally adaptive dialogues, pragmatic awareness, cross-cultural sensitivity). Therefore, alongside ongoing assessments of AI tool effectiveness, future

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research should more actively pursue constructive pathways for refining AI systems and designing innovative, AI-supported curricula that foster holistic, learner-centered English language education in Algerian university contexts.

Studies that primarily describe students' perceptions, experiences, familiarity, or attitudes toward AI tools typically through surveys, observations, or brief qualitative accounts comprised 3 studies (15%). These descriptive/technical contributions provide valuable entry-level insights into how Algerian EFL learners encounter and interpret AI-enhanced language learning methods, often highlighting initial acceptance, perceived usefulness, challenges in adoption, and contextual factors influencing engagement. Additionally, qualitative research focused on detailed content analysis of learner utterances, in-depth interviews, or case studies was represented in 2 studies (10%), offering richer, context-sensitive explorations of interaction patterns, pragmatic use, affective responses, and experiential nuances of AI-supported practice. Mixed methods approach, combining quantitative metrics with qualitative depth for triangulation and more comprehensive understanding, were limited to 1 study (5%).

In summary, research on AI utilization in Algerian university English learning is predominantly quantitative (50%), reflecting a strong commitment to empirical validation of measurable outcomes in linguistic and affective domains. Theoretical/conceptual and developmental studies (20%) demonstrate proactive efforts to build foundational tools and frameworks, while descriptive/technical (15%), qualitative (10%), and mixed-methods (5%) approaches remain comparatively limited. Given the substantial pedagogical potential of artificial intelligence, there is an urgent need for accelerated research on system development and curriculum integration to translate conceptual possibilities into practical, effective, and sustainable applications. Moreover, the relative scarcity of qualitative and mixed-methods studies points to a clear opportunity to expand in-depth, learner-centered investigations that capture nuanced reactions, experiential processes, detailed observational data, and long-term effects. Greater emphasis on these methods will enable a more holistic examination of AI's impact on linguistic competence, affective engagement, pragmatic development, and intercultural communicative competence building, thereby informing more responsive, evidence-based, and culturally attuned AI-enhanced EFL pedagogy in Algerian higher education settings.

4. Analysis by Research Themes and Content

The primary research theme in the 20 included studies on artificial intelligence applications in university English language learning was the investigation of individual linguistic functions in English. The reviewed literature overwhelmingly concentrated on how AI tools predominantly chatbots and, in more recent contributions, generative language models support and enhance discrete language skills and components.

Across the corpus, studies frequently targeted specific linguistic domains, including vocabulary acquisition, grammar accuracy and usage, reading comprehension and processing, listening proficiency and phonological awareness, speaking fluency and oral production, writing development and composition quality, and pragmatic competence (e.g., speech acts, conversational routines, politeness strategies). These investigations typically examined the effectiveness of AI-mediated practice in improving targeted skills through controlled tasks, immediate feedback mechanisms, repetitive drills, personalized scaffolding, and automated evaluation features. The strong focus on individual linguistic functions reflects the practical and skill-oriented priorities of Algerian EFL research at the university level, where AI is most often employed to address identifiable weaknesses in core language components within constrained instructional time and resource environments.

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While affective factors (e.g., motivation enhancement, anxiety reduction, increased self-confidence, and positive attitudes toward technology) and emerging intercultural communicative competence (e.g., cultural awareness, sensitivity to pragmatic norms, cross-cultural interaction, and culturally adaptive communication) appeared as secondary or complementary themes in a minority of studies, the dominant emphasis remained on linguistic outcomes. This pattern is consistent with the developmental stage of AI integration in Algerian higher education, where research has prioritized establishing empirical evidence for skill-specific efficacy before expanding to more integrative, holistic, or intercultural dimensions.

The concentration on discrete linguistic functions underscores a strategic focus on building foundational English proficiency, which serves as a prerequisite for advanced communicative and intercultural competence in globalized academic and professional contexts. At the same time, the relative underrepresentation of studies addressing integrated skill development or intercultural communicative competence suggests a clear direction for future research: extending beyond isolated linguistic gains to examine how AI tools can foster interconnected language abilities, affective engagement, pragmatic awareness, and culturally responsive interaction in Algerian university EFL settings.

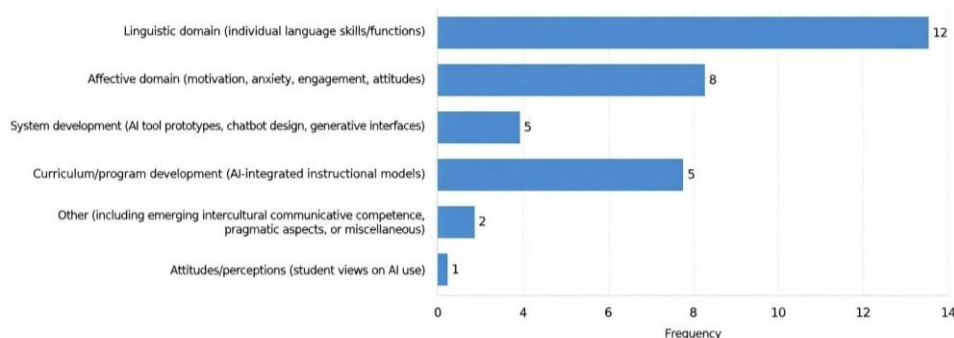


Figure 5. Distribution of Research Themes (Multiple Counting Allowed)

Figure 5 presents the results of the thematic analysis, with multiple counting permitted to reflect studies that address more than one theme. The most frequent research theme was the exploration of individual linguistic functions in English, appearing in 12 studies. These investigations primarily examined how AI tools support specific language skills, including vocabulary acquisition, grammar accuracy, reading comprehension, listening proficiency, speaking fluency, writing development, and pragmatic competence.

The second most common theme was the affective domain, covered in 8 studies. These works focused on learner-centered emotional and psychological responses to AI-supported English learning, such as motivation, satisfaction, self-esteem, anxiety reduction, engagement, self-efficacy, and overall attitudes toward AI as a language learning tool. This emphasis highlights the field's recognition of AI's capacity to create low-pressure, judgment-free practice environments that positively influence learners' affective states in Algerian university EFL contexts.

Studies addressing AI system development or comparative analyses of various chatbots each accounted for 5 publications. These contributions explored the design, prototyping, and pedagogical adaptation of AI tools (e.g., rule-based chatbots, generative interfaces, intelligent assistants), as well as comparative evaluations of different chatbot types for English language

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practice. Such research indicates ongoing efforts to build and refine accessible, effective AI systems tailored to university-level English education. Additionally, 2 studies focused on machine translation in the context of AI applications, primarily investigating its effectiveness in supporting English writing activities (e.g., automated translation for composition assistance or error correction). Only 1 study addressed assessment-related themes, such as automated scoring, immediate error feedback, or AI-driven evaluation mechanisms. This limited attention to assessment suggests that, despite AI's strong potential for real-time, continuous feedback and automated grading, research on AI-supported English evaluation in Algerian university settings remains underdeveloped and represents a significant gap for future exploration.

Overall, the thematic distribution confirms that research on AI utilization in Algerian university English learning remains predominantly oriented toward linguistic skill enhancement and affective outcomes, with a notable but secondary focus on system and curriculum development. The relative scarcity of studies on assessment and broader intercultural communicative competence indicates areas for growth. Given AI's capacity to provide automated, immediate, and personalized support across evaluation, feedback, and culturally adaptive interaction, future research should more actively pursue these underexplored dimensions to achieve more comprehensive pedagogical impact.

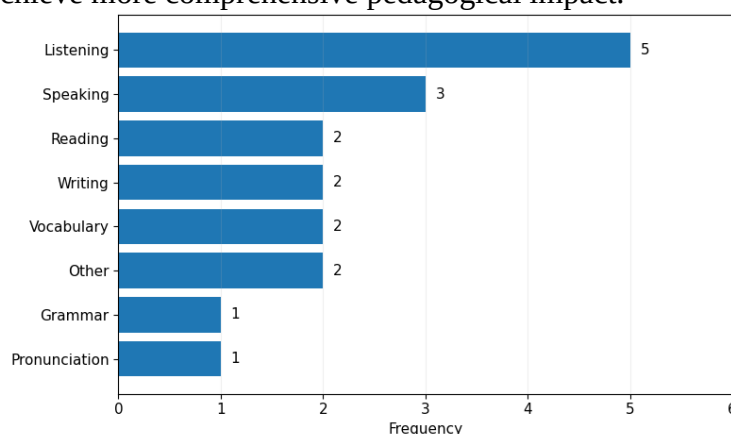


Figure 6. Distribution of linguistic domains across the 20 included studies (multiple counting permitted).

Figure 6 shows the distribution of linguistic domains across the 20 included studies on artificial intelligence applications in Algerian university English language learning (multiple counting permitted). Listening is the most frequent focus ($n = 5$), followed by speaking ($n = 3$), with reading, writing, vocabulary, and other domains each at $n = 2$, and grammar and pronunciation at $n = 1$. This distribution highlights the emphasis on receptive and productive oral skills in AI-supported English learning research. One study examined both writing and speaking simultaneously. As productive skills (productive skills), writing and speaking share the common characteristics of requiring learners to generate and output language, albeit in written and oral modalities respectively. This pattern indicates that AI-supported English learning in Algerian university contexts is particularly effective in enhancing productive skills, where learners must actively produce language through AI-mediated practice, feedback, and interaction.

Receptive skills (receptive skills) listening and reading were also represented ($n = 2$), demonstrating AI's utility in supporting input processing, comprehension, and phonological/orthographic awareness. Beyond these core domains, AI applications positively

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influenced other linguistic areas, including grammar, vocabulary, translation, and related competencies. The "other" category in Figure 6 encompasses studies that analyzed AI's role in English literature classes (e.g., enhancing discussion skills) or examined discourse patterns in chatbot interactions.

Most of the selected studies utilized various AI chatbots (see Table 1). Figure 7 presents an analysis of the top three most frequently used chatbots, Mitsuku, Indigo, and Elbot and their associations with specific linguistic domains. Each chatbot was employed in 3 studies, with their distinct functionalities enabling targeted improvements aligned with research objectives.

- Mitsuku was primarily applied in studies on writing skill development and investigations of chatbot utterance volume according to learner proficiency levels. As a Pandorabot-type system based on AIML, Mitsuku supports everyday conversational practice and web-based search capabilities, making it suitable for output-oriented tasks requiring sustained production and refinement of written language.
- Indigo, with its voice recognition capabilities, was used in research on speaking skill enhancement and speech act analysis. Indigo supports both spoken and written input/output, facilitating oral production, conversational flow, and pragmatic competence development through voice-based interaction.
- Elbot was employed in studies targeting improvements in vocabulary, writing, listening, and reading skills. Its versatility across multiple modalities made it effective for integrated skill practice and receptive/productive language processing.

In summary, among the chatbots commonly used in Algerian university English learning research, Mitsuku was predominantly associated with writing-related linguistic domains, while voice-supported Indigo was linked to speaking and oral pragmatic improvement. Elbot demonstrated broader applicability across receptive and productive skills. These patterns highlight how chatbot selection is guided by specific linguistic targets and pedagogical goals, contributing to enhanced learning outcomes in targeted language areas.

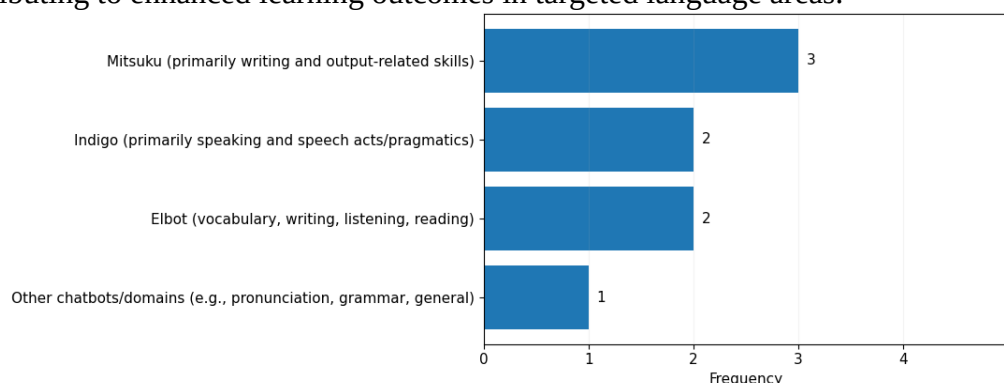


Figure 7. Association of top chatbots with linguistic domains

Figure 7 displays the association of top chatbots with linguistic domains across the included studies (multiple counting permitted). Mitsuku ($n = 3$) is most frequently associated with writing-related skills, Indigo ($n = 2$) with speaking and pragmatic/speech act analysis, and Elbot ($n = 2$) with vocabulary, writing, listening, and reading. This reflects targeted selection of chatbot functionalities to support specific productive and receptive language skills in Algerian university English learning.

As evidenced by the analysis above, research on artificial intelligence applications in university English language learning in Algeria predominantly centers on chatbots and their

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effects on learners' functional linguistic competence and affective domains. The findings reveal a clear pattern: most studies focus on improving specific language skills (e.g., vocabulary, grammar, speaking, writing, listening, reading) and addressing emotional and motivational factors (e.g., anxiety reduction, increased engagement, self-efficacy, positive attitudes toward AI tools). This orientation reflects the practical priorities of Algerian EFL scholarship, where accessible, low-cost conversational AI tools are leveraged to support skill-specific practice and create supportive, low-anxiety learning environments within resource-constrained higher education settings.

These results also highlight a divergence between domestic (Algerian) research trends and international patterns. While Algerian studies concentrate primarily on chatbot-centered interventions for linguistic and affective gains, international literature demonstrates a broader and more comprehensive integration of AI technologies in foreign language education. Overseas research not only explores chatbots and AI speakers but also incorporates serious games (serious games) for immersive task-based learning, humanoid robots for embodied interaction and role-play simulation, and AI-based platforms for adaptive, personalized instruction across multiple modalities. This diversity enables international studies to address a wider spectrum of pedagogical objectives, including integrated skill development, cultural simulation, pragmatic competence, and long-term learner autonomy.

Consequently, while the current body of Algerian research provides valuable evidence of AI's effectiveness in targeted linguistic and affective domains, there is a clear need to expand the scope and methodological diversity in future work. In addition to continuing investigations into functional language improvement and emotional responses, Algerian scholars should increasingly explore more comprehensive and innovative applications of AI technologies. This includes the integration of humanoid robots for realistic, embodied conversational practice, AI-driven platforms for dynamic curriculum adaptation, and multimodal tools (e.g., combining voice, text, visual, and gestural elements) to foster holistic language proficiency and intercultural communicative competence. Such directions would enable Algerian university English education to move beyond skill-specific interventions toward more transformative, culturally responsive, and globally aligned pedagogical models.

This broader exploration is essential for realizing AI's full potential in addressing the multifaceted demands of English language learning in Algerian higher education, including bridging linguistic gaps, enhancing affective engagement, and cultivating intercultural communicative competence for learners preparing to participate in diverse global and professional contexts. Expanding research in these areas will contribute to more equitable, effective, and forward-looking AI-enhanced EFL pedagogy tailored to the Algerian context.

Conclusion

The present study systematically synthesized and analyzed literature on the integration of artificial intelligence in university English language learning to assess the current state of research in Algerian higher education and propose future directions for AI-enhanced EFL pedagogy. A total of 20 studies meeting the inclusion criteria were identified through a rigorous selection process. The findings indicate that research in this area first emerged in 2004 and has shown a steady and sustained increase since 2018, reflecting growing scholarly interest in AI as a pedagogical tool. Among the selected studies, only three were theses (master's and doctoral), while the majority were published in diverse academic journals across various disciplinary fields.

Analysis of research methods revealed that quantitative approaches dominated, accounting for 50% of the studies ($n = 10$), underscoring a strong preference for empirical, measurable

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outcomes. Theoretical and conceptual research, including AI system development and instructional program design, comprised 20% (n = 4). Descriptive/technical studies represented 15% (n = 3), qualitative research 10% (n = 2), and mixed-methods research 5% (n = 1). This methodological profile highlights the field's emphasis on statistical validation while indicating a relative underrepresentation of qualitative and mixed methods designs, which could offer deeper insights into learner experiences and contextual nuances.

Thematic analysis showed that the predominant research focus was on enhancing individual linguistic functions in English (e.g., vocabulary, grammar, listening, speaking, reading, writing, and pragmatic competence). Productive skills particularly writing (n = 5) and speaking (n = 3) received the most attention, with one study addressing both simultaneously. Receptive skills (listening and reading) were explored in 2 studies, while grammar, vocabulary, translation, and related areas also appeared. The “other” category included research examining AI's role in English literature discussions, discourse analysis of chatbot interactions, and miscellaneous topics. These patterns demonstrate that AI applications in Algerian university English learning are primarily directed toward skill-specific improvement and affective outcomes (e.g., motivation, anxiety reduction, self-efficacy), with chatbots serving as the central tool.

Among the chatbots most frequently utilized, Mitsuku was predominantly associated with writing-related skills, Indigo with speaking and pragmatic/speech act analysis, and Elbot with vocabulary, writing, listening, and reading. This targeted use of chatbot functionalities reflects deliberate alignment with specific pedagogical objectives. In contrast, international research on AI in foreign language learning exhibits a broader scope, encompassing not only chatbots and AI speakers but also serious games for task-based immersion, humanoid robots for embodied role-play and storytelling, and AI platforms for adaptive, multimodal instruction. These approaches address comprehensive communicative competence, cultural acquisition, learner utterance facilitation, content control, and interactive motivation, often enabling teachers to delegate routine roles and focus on students requiring greater support.

The current body of Algerian research, while robust in its focus on linguistic and affective domains through accessible chatbot tools, remains relatively narrow in technological and pedagogical scope. To advance effective foreign language learning in Algerian university contexts, future studies should expand beyond chatbot-centered interventions to incorporate more diverse AI applications, including humanoid robots for dynamic, embodied interaction, AI-based platforms for personalized and culturally adaptive learning, and integrated systems that combine multiple modalities to foster holistic proficiency. Such directions would better support the development of intercultural communicative competence, pragmatic awareness, and long-term learner autonomy, aligning Algerian EFL research more closely with global trends while addressing local needs and constraints.

In conclusion, although Algerian university research on AI in English learning has made significant progress in establishing empirical evidence for linguistic skill enhancement and affective benefits, continued diversification of tools, methods, and themes is essential. Greater emphasis on comprehensive AI integration, intercultural dimensions, and innovative pedagogical models will enable the field to realize the full transformative potential of artificial intelligence in higher education English language education.

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