Proceedings of the 6h International Scientific and Practical Conference «Innovative Development in the Global Science»

(October 26-28, 2025). Boston, USA

No 269

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Exploring the impact of AI-based technologies on English language acquisition in higher education institutions

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Abstract. This study investigates the influence of artificial intelligence (AI)-based technologies on English language acquisition among students in higher education institutions. With the proliferation of AI tools such as intelligent tutoring systems, chatbots, and adaptive learning platforms, the landscape of language education is rapidly evolving. Using a mixed-methods approach, this research analyzes student performance data and gathers qualitative insights from educators and learners. The findings suggest that AI technologies significantly enhance vocabulary acquisition, pronunciation accuracy, and learner engagement, though challenges remain in personalization and ethical implementation.

Keywords: *Artificial intelligence, English language acquisition, higher education, digital technologies, intelligent tutoring systems, adaptive learning, grammar, vocabulary, pronunciation, student motivation, learning effectiveness, AI ethics, personalized learning, online education, gamification, real-time feedback.*

Introduction

The integration of artificial intelligence (AI) into educational environments has revolutionized traditional teaching and learning practices, particularly in the field of language education. As English continues to serve as the dominant global language in academia, business, and international communication, proficiency in English has become a critical requirement for students in higher education institutions worldwide. In response to this demand, universities are increasingly adopting AI-based technologies to enhance English language acquisition and support diverse learner needs.

AI-based tools—such as intelligent tutoring systems,

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natural language processing (NLP) applications, speech recognition software, and adaptive learning platforms—offer personalized, data-driven learning experiences that differ significantly from conventional classroom instruction. These technologies can analyze learner input, provide instant feedback, and tailor content to individual proficiency levels. For example, applications like Duolingo and Grammarly utilize machine learning algorithms to reinforce vocabulary and grammar, while platforms such as ELSA Speak and ChatGPT enable students to practice pronunciation and engage in simulated conversations [1].

The potential benefits of AI in language learning are substantial. Studies have shown that AI can increase learner motivation, improve retention rates, and foster autonomous learning. Moreover, AI tools can accommodate various learning styles and provide flexible access to educational resources beyond the classroom. However, despite these advantages, the empirical evidence on the effectiveness of AI in English language acquisition remains limited and fragmented [2]. Concerns persist regarding the lack of human interaction, ethical implications of data usage, and the ability of AI systems to understand cultural and contextual nuances in language use.

This study aims to explore the impact of AI-based technologies on English language acquisition in higher education institutions. It investigates how these tools influence learner outcomes, engagement, and pedagogical practices. By examining both quantitative performance data and qualitative feedback from students and educators, the research seeks to provide a comprehensive understanding of the role AI plays in shaping modern language education and to offer practical recommendations for its effective implementation.

Materials and methods

This study employed a mixed-methods research design, combining quantitative and qualitative approaches to provide a holistic understanding of how AI-based technologies influence English language acquisition in higher education [3]. The rationale for this design lies in its ability to capture both measurable learning outcomes and the nuanced experiences of learners and educators. Quantitative data were used to assess improvements in language proficiency, while qualitative data provided insights into engagement, motivation, and pedagogical adaptation.

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The research was conducted across three public universities in Kazakhstan, each offering English language instruction as part of their undergraduate curriculum. The study spanned one academic semester (12 weeks), from September to December 2024, allowing sufficient time for students to engage with AI tools and demonstrate progress.

A total of 120 undergraduate students participated in the study. They were enrolled in English language courses across various faculties, including engineering, economics, and humanities. Participants were selected using stratified random sampling, ensuring representation across different academic disciplines and English proficiency levels (beginner, intermediate, and advanced).

Additionally, 15 English language instructors with at least three years of teaching experience were recruited for qualitative interviews. Their insights were crucial for understanding how AI tools were integrated into teaching practices and how they perceived changes in student behavior and performance.

Four widely accessible AI-powered platforms were selected based on their relevance to core language skills:

Duolingo: Used for vocabulary acquisition and grammar reinforcement through gamified exercises and adaptive learning paths.

Grammarly: Provided automated writing feedback, focusing on grammar, punctuation, clarity, and tone.

ChatGPT: Enabled conversational practice, writing support, and contextual language use through simulated dialogue.

ELSA Speak: Offered pronunciation training using speech recognition and phonetic analysis, with personalized feedback.

These tools were chosen for their popularity, accessibility, and alignment with the four core language competencies: reading, writing, speaking, and listening.

The study followed a structured implementation plan:

Week 1 – Orientation and Pre-Testing: Students were introduced to the AI tools and trained on how to use them effectively. Baseline assessments were conducted to measure vocabulary knowledge, grammar proficiency, and pronunciation accuracy.

Weeks 2-11 – Intervention Phase: Students used the AI tools weekly as part of their coursework and homework assignments. Instructors incorporated AI platforms into

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lesson plans, encouraging students to engage with the tools both in and outside the classroom. Mid-semester surveys were distributed in Week 6 to assess initial perceptions and engagement levels.

Week 12 – Post-Testing and Interviews: Final assessments were administered to evaluate progress in language proficiency. Students completed a second survey to reflect on their experience with AI tools. Semi-structured interviews were conducted with instructors to gather qualitative data on pedagogical impact.

Quantitative Instruments

– Language Proficiency Tests: Standardized tests were used to assess vocabulary (multiple-choice), grammar (error correction and sentence completion), and pronunciation (recorded speech evaluated using ELSA Speak's scoring system).

– Engagement Surveys: Two Likert-scale questionnaires (administered mid-semester and post-semester) measured student motivation, satisfaction, perceived usefulness of AI tools, and frequency of use.

Quantitative Analysis

– Paired sample t-tests were conducted to compare pre- and post-test scores in vocabulary, grammar, and pronunciation.

– Descriptive statistics summarized survey responses, including mean scores and standard deviations for engagement metrics.

– Correlation analysis examined relationships between frequency of AI tool usage and improvement in test scores.

Qualitative Instruments

– Instructor Interviews: Semi-structured interviews explored how educators integrated AI into their teaching, observed changes in student performance, and identified challenges.

– Open-Ended Survey Questions: Students were invited to share their thoughts on the strengths and limitations of each AI tool, as well as suggestions for improvement.

Qualitative Analysis

– Interview transcripts and open-ended survey responses were analyzed using thematic coding in NVivo software.

– Emergent themes included student autonomy, feedback quality, technological challenges, and instructor adaptation.

– Triangulation was used to cross-validate findings from different data sources.

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This study adhered to the highest ethical standards in educational research. Prior to data collection, ethical approval was formally obtained from the Institutional Review Boards (IRBs) of all participating universities. The research protocol was reviewed to ensure compliance with national and international guidelines for human subject research.

All participants—both students and instructors—were provided with detailed information about the purpose, procedures, and potential risks and benefits of the study. Informed consent was obtained in writing, and participants were assured that their involvement was entirely voluntary. They were informed of their right to withdraw from the study at any point without academic or personal consequences.

To protect participant privacy, all data were anonymized during collection and analysis. Personal identifiers were removed, and responses were coded to ensure confidentiality. Data were stored on encrypted, password-protected servers accessible only to the research team, and were used exclusively for academic purposes.

Additionally, care was taken to ensure that the use of AI-based technologies did not disadvantage any participant. Students were given equal access to digital tools and support, and accommodations were made for those with limited technological proficiency or access. The study also considered the ethical implications of AI use, including concerns related to data privacy, algorithmic bias, and the potential for over-reliance on automated feedback.

Results and discussions

The findings of this study reveal a multifaceted impact of AI-based technologies on English language acquisition among undergraduate students in higher education institutions. Through a combination of quantitative assessments and qualitative insights, the research demonstrates that AI tools contribute positively to language proficiency, learner engagement, and instructional practices, while also presenting certain limitations that warrant further consideration.

Quantitative data collected from pre- and post-intervention assessments indicate significant improvements in core language competencies. Vocabulary acquisition showed the most notable progress, with average scores increasing from 62.4% to 81.1%. This improvement was particularly evident among beginner-level students, who benefited from the gamified and adaptive features of platforms like Duolingo.

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The tool's use of spaced repetition and immediate feedback helped reinforce word retention and contextual usage.

Grammar proficiency also improved substantially, with scores rising from 58.7% to 75.3%. Grammarly played a central role in this development by offering real-time corrections and explanations. Students reported that the tool enhanced their awareness of grammatical structures and encouraged more accurate writing. However, some learners noted that while Grammarly corrected errors efficiently, it did not always explain the underlying rules in depth, which could limit deeper understanding.

Pronunciation accuracy, assessed using ELSA Speak's phonetic scoring system, improved by an average of 18.2%. Students appreciated the app's visual feedback on stress, intonation, and articulation, which allowed them to identify and correct persistent pronunciation issues. Intermediate learners showed the greatest gains, especially in segmental features such as vowel clarity and consonant articulation. Nevertheless, some students with strong regional accents reported that the app occasionally misinterpreted their speech, highlighting the need for more inclusive voice recognition models.

Qualitative data from student surveys and instructor interviews further support the positive impact of AI tools on learner engagement and motivation. Over 87% of students expressed that AI-enhanced learning made English more enjoyable and accessible. The conversational capabilities of ChatGPT, in particular, were praised for reducing anxiety and enabling students to practice speaking in a low-pressure environment. Many students described the experience as akin to interacting with a supportive tutor who provided instant feedback without judgment.

Instructors also observed increased participation and preparedness among students who actively used AI tools. They noted that learners were more confident in class discussions and more consistent in submitting assignments. However, educators raised concerns about over-reliance on automated feedback. Some students tended to accept corrections passively without critically engaging with the reasoning behind them, which could hinder the development of independent language skills.

Despite these benefits, several challenges emerged during the study. Technical barriers, such as limited internet access and device compatibility issues, affected consistent usage

for some students. Additionally, personalization gaps were evident, particularly for non-native accents and culturally specific language use. Ethical concerns related to data privacy and the storage of voice recordings and writing samples were also raised by both students and instructors.

Overall, the results suggest that AI-based technologies can significantly enhance English language acquisition when integrated thoughtfully into higher education curricula. These tools offer scalable, flexible, and personalized learning experiences that complement traditional instruction. However, their effectiveness depends on careful implementation, ongoing instructor support, and attention to ethical and cultural considerations.

The discussion highlights the importance of adopting a balanced approach to AI integration—one that leverages technological innovation while preserving the human elements of teaching, such as empathy, contextual understanding, and interpersonal communication. Future research should explore long-term outcomes, cross-cultural adaptability, and the development of hybrid models that combine AI-driven personalization with human-led instruction.

Conclusion

This study has demonstrated that the integration of AI-based technologies into English language instruction in higher education institutions offers significant potential to enhance language acquisition, learner engagement, and instructional effectiveness [4]. Quantitative findings revealed substantial improvements in vocabulary, grammar, and pronunciation among students who actively used AI tools such as Duolingo, Grammarly, ChatGPT, and ELSA Speak. These platforms provided personalized learning experiences, immediate feedback, and flexible access to language practice, contributing to measurable gains in proficiency [5].

Qualitative data further underscored the motivational benefits of AI-enhanced learning environments. Students reported increased confidence, autonomy, and enjoyment in their language studies, while instructors observed greater participation and preparedness in the classroom [6]. However, the study also identified important challenges, including over-reliance on automated feedback, limitations in personalization for diverse linguistic backgrounds, and ethical concerns related to data privacy and algorithmic transparency [7].

The findings suggest that AI technologies should be viewed

not as replacements for traditional instruction, but as powerful supplements that can enrich the learning process when thoughtfully integrated [8]. Successful implementation requires ongoing support for educators, clear ethical guidelines, and a commitment to inclusive design that accommodates diverse learner needs [9].

Future research should explore long-term outcomes of AI-assisted language learning, cross-cultural adaptability of AI tools, and the development of hybrid pedagogical models that combine technological innovation with human-centered teaching [10]. By continuing to investigate and refine the role of AI in education, institutions can better prepare students for global communication and academic success in an increasingly digital world.

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