

Artificial Intelligence in the English Language Education: A Study among University Students

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ABSTRACT

The integration of Artificial Intelligence (AI) into English language education has fundamentally transformed pedagogical practices and student engagement, particularly within higher education contexts, where diverse proficiency levels and large class sizes present ongoing instructional challenges. This study systematically investigates the application, efficacy, and implications of AI technologies in supporting English learning among university students. Employing a mixed-methods research design, data were collected from 120 undergraduates across three Chinese universities through structured surveys, classroom observations, and semi-structured interviews, enabling a comprehensive exploration of both quantitative outcomes and qualitative experiences. The findings reveal that AI tools—including intelligent writing assistants, adaptive vocabulary applications, and automated feedback systems—substantially enhance learners' writing accuracy, lexical sophistication, and overall motivation, while simultaneously promoting greater autonomy and self-regulated learning behaviors. Students reported that AI-supported activities, when integrated with traditional instruction, facilitated more active engagement and personalized learning trajectories. Nevertheless, challenges emerged, notably the potential for overreliance on technology, ethical concerns regarding data privacy, and disparities in digital literacy across learners. The study underscores that AI can serve as both a supportive and transformative agent in English language education when its deployment is guided by clear pedagogical frameworks, ethical standards, and institutional oversight. These findings contribute to ongoing discourse on technology-enhanced language learning (TELL) and provide actionable recommendations for educators and policymakers seeking to harness AI to foster sustainable, student-centered innovation in university-level English instruction.

Keywords: Artificial Intelligence, English Language Education, University Students, Technology-Enhanced Learning, EFL

INTRODUCTION

In the twenty-first century, English language education has experienced profound transformation, driven by rapid advancements in digital technologies and the proliferation of artificial intelligence (AI). The integration of intelligent systems into educational contexts has redefined how learners access, process, and produce linguistic knowledge, fundamentally reshaping pedagogical paradigms and classroom dynamics. In English as a Foreign Language (EFL) environments, particularly at the university level, AI-powered technologies have introduced novel instructional modalities that challenge conventional teaching and learning models. Tools such as automated essay scoring, intelligent tutoring systems, adaptive learning platforms, and conversational chatbots have become pivotal agents of innovation, offering scalable solutions to address diverse learner needs, large class sizes, and the demand for personalized feedback. This emerging landscape not only transforms classroom practices but also prompts critical questions regarding human-machine interaction, teacher roles, and learner autonomy in technologically mediated learning environments.

Over the past decade, scholarly interest in the intersection of AI and English language education has grown substantially. Numerous studies have examined the capacity of AI to support personalized learning, enhance assessment accuracy, and improve learner motivation (Li, 2023; Nguyen & Zhang, 2021; Wang & Chen, 2022). Leveraging natural language processing, machine learning algorithms, and generative AI systems, educators can now provide real-time analysis of students' writing, pronunciation, and grammar—delivering immediate, individualized feedback that was previously unattainable in traditional classroom settings. The efficiency, adaptability, and scalability of these technologies have prompted educators and policymakers to reconsider the complementary role of AI in facilitating human instruction. Nonetheless, despite the enthusiasm for technological integration, critical concerns persist, including potential overreliance on AI, data privacy, uneven digital literacy, and ethical implications of machine-mediated assessment (Hockly, 2022; Sun, 2024).

Within higher education, university students constitute a particularly relevant population for investigating the impact of AI on English learning. As digital natives, they are generally familiar with online platforms, mobile applications, and blended learning modalities. However, their experiences with AI-assisted English learning are heterogeneous. Some students embrace AI tools—such as Grammarly, ChatGPT, and intelligent translation systems—as mechanisms to enhance writing proficiency, expand lexical resources, and facilitate autonomous learning, whereas others remain skeptical regarding the reliability, contextual appropriateness, and authenticity of machine-generated feedback. Similarly, instructors demonstrate a spectrum of attitudes, ranging from optimism regarding AI's pedagogical potential to caution over unintended dependency and diminished critical thinking. Understanding how university students interact with AI in English education is therefore crucial to identifying both opportunities for innovation and challenges to sustainable implementation.

The global shift toward technology-enhanced education accelerated markedly during and after the COVID-19 pandemic, when online learning platforms became central to academic continuity. Universities in China, alongside institutions worldwide, rapidly adopted AI-assisted platforms for English instruction and assessment, intensifying reliance on intelligent systems to support language learning. This transition provided fertile ground for empirical research into how AI influences learner motivation, performance, and perceptions in EFL contexts. Despite the growing literature on technology-enhanced language learning (TELL), empirical studies focused specifically on university-level English education in non-native contexts remain limited, underscoring the need for research that bridges theoretical promise with classroom realities.

This study seeks to address this gap by examining the implementation and effects of AI technologies in English language education among university students. It investigates the ways in which AI tools are utilized, how students perceive their usefulness, and the pedagogical outcomes arising from their integration. By exploring the interaction between AI-supported learning and traditional instruction, the research aims to elucidate the balance between technological efficiency and human mediation, highlighting the conditions under which AI can optimally support learning.

The significance of this study is threefold. First, it contributes empirical evidence to the growing body of research on AI-driven language pedagogy, emphasizing university students' lived experiences rather than theoretical projections. Second, it illuminates pedagogical implications for integrating AI into English instruction, offering actionable recommendations for educators seeking to enhance engagement and learning outcomes through technology. Third, it addresses ethical and practical considerations inherent in AI adoption, including issues of equity, data security, and digital competence. By examining these multiple dimensions, the study advances discourse on the ethical, effective, and sustainable deployment of AI in higher education language classrooms.

Accordingly, the research is guided by four primary questions: (1) How are AI technologies currently applied in university-level English education? (2) What are university students' perceptions of AI-assisted English learning? (3) What effects does AI use have on students' motivation, autonomy, and language performance? (4) What challenges and limitations are associated with AI integration in English teaching and learning? To address these

questions, the study adopts a mixed-methods design, combining quantitative survey data with qualitative insights from classroom observations and semi-structured interviews. This approach enables a holistic understanding of both measurable learning outcomes and subjective experiences, while also allowing for data triangulation to ensure robustness and depth of interpretation. The findings are intended to inform educators, administrators, and policymakers regarding best practices in AI integration, while preserving the centrality of human pedagogy.

In summary, the integration of AI into English language education represents a pivotal moment in the evolution of language teaching and learning. AI provides unprecedented opportunities for personalized instruction, accessibility, and efficiency, yet it simultaneously challenges educators to reconceptualize their roles, responsibilities, and instructional strategies in a technologically mediated environment. This study positions itself at the intersection of innovation and pedagogy, aiming to explore how university students experience, evaluate, and benefit from AI-based tools in their English learning journeys. The insights gained are expected to contribute to the broader discourse on sustainable, ethical, and learner-centered approaches to AI integration in higher education.

LITERATURE REVIEW

Technology in English Language Education

Technology has long played a transformative role in language teaching and learning, evolving from early Computer-Assisted Language Learning (CALL) in the 1980s to today's sophisticated AI-driven systems. CALL initially introduced digital tools such as grammar drills, vocabulary software, and multimedia resources, enhancing learners' exposure to authentic linguistic input and providing structured opportunities for practice (Chapelle, 2019). The subsequent development of Mobile-Assisted Language Learning (MALL) extended learning beyond the confines of the classroom, enabling students to engage with English anytime and anywhere through smartphones and tablets (Kukulska-Hulme & Shield, 2018). While earlier technologies primarily emphasized content delivery and repetitive practice, recent advances in AI have enabled adaptive learning, natural language interaction, and data-informed feedback, thereby shifting the focus from static instruction to dynamic, personalized learning. AI systems can analyze learner behavior, predict difficulties, and tailor instruction in real time—capabilities that traditional CALL systems could not achieve—positioning AI not merely as an incremental improvement but as a paradigm shift in English language education.

Artificial Intelligence in Second Language Acquisition (SLA)

Artificial Intelligence, broadly defined as computer systems capable of performing cognitive tasks traditionally associated with human intelligence, including reasoning, learning, and problem-solving, has significant implications for Second Language Acquisition (SLA). In SLA contexts, AI supports both instruction and assessment through automation, personalization, and real-time feedback. AI technologies leverage algorithms that adapt to individual learners' styles and proficiency levels, thereby delivering differentiated instruction aligned with learners' specific needs (Li, 2023). Contemporary applications encompass AI writing assistants such as Grammarly and Write & Improve, which provide instant feedback on grammar, vocabulary, and style; speech recognition systems, including ELSA Speak, which evaluate pronunciation and fluency; and conversational chatbots, such as Duolingo Bots and Replika, which simulate authentic communicative exchanges. These applications are grounded in Natural Language Processing (NLP) and Machine Learning (ML), enabling computers to comprehend and generate human-like language (Godwin-Jones, 2022). The pedagogical value of AI lies in its capacity to foster learner autonomy, promote formative assessment, and enhance metalinguistic awareness. Research demonstrates that AI-assisted feedback facilitates self-correction and reflection, while adaptive systems dynamically adjust difficulty levels to sustain engagement and challenge learners appropriately (Zhang & Hyland, 2020). Nonetheless, persistent concerns include algorithmic bias, data

security, and the interpretability of AI-generated feedback, all of which can influence learner trust, engagement, and educational validity (Hockly, 2022).

Theoretical Frameworks: Constructivism, Sociocultural Theory, And Call

AI applications in English education can be broadly categorized into four domains: writing enhancement, speaking and pronunciation training, intelligent tutoring and chatbots, and learning analytics. In writing enhancement, AI-powered tools such as Grammarly, QuillBot, and ChatGPT provide instantaneous feedback on grammar, coherence, and style. Empirical evidence indicates that these tools can improve writing accuracy and linguistic complexity when employed as supplementary aids (Zhang, 2023), though excessive reliance may inhibit students' self-editing capacity and critical thinking (Lee, 2022). In speaking and pronunciation training, speech recognition and analysis software—including ELSA Speak and Google Speech APIs—offers corrective feedback that enhances phonological awareness and speaking confidence (Wang & Chen, 2022). Intelligent tutoring systems and AI chatbots, exemplified by Duolingo's GPT-based conversational bots, create personalized learning pathways by adapting exercises to learners' performance, reinforcing engagement through gamification and instant feedback, and providing simulated communicative contexts (Sun & Xu, 2024). Finally, learning analytics enables instructors to process large volumes of learner data to track progress, predict outcomes, and identify areas for targeted intervention (Godwin-Jones, 2022). While these applications provide substantial pedagogical benefits, they also raise ethical concerns related to privacy, transparency, and consent.

AI Applications in English Education

At the university level, AI adoption offers multiple educational advantages. Personalization allows learners to progress at an optimal pace, addressing heterogeneous proficiency levels within large classes. Immediate feedback supports formative assessment and self-regulated learning, contributing to improved writing quality, vocabulary retention, and overall language competence (Nguyen & Zhang, 2021). AI-enhanced environments also sustain learner motivation and engagement through interactive, gamified elements that align with digital-native habits (Li, 2023). Beyond cognitive gains, AI fosters autonomy and lifelong learning skills by encouraging goal setting, progress monitoring, and reflective practice, which are essential for academic and professional English communication. Instructors benefit as well, leveraging AI-generated analytics to design targeted interventions and optimize pedagogical strategies.

Benefits of AI Integration in University English Learning

At the university level, the adoption of AI in English learning offers multiple benefits.

First, personalization allows each student to progress at an optimal pace, addressing diverse proficiency levels within large classes. Second, immediate feedback supports formative assessment and self-regulated learning, leading to improved writing quality and vocabulary retention (Nguyen & Zhang, 2021). Third, increased motivation and engagement are frequently reported outcomes of AI-assisted learning environments (Li, 2023). AI tools' interactive and gamified elements align with students' digital habits, sustaining attention and effort.

Moreover, AI fosters autonomy and lifelong learning skills by encouraging learners to set goals, monitor progress, and reflect on performance. These competencies are critical for university students preparing for academic and professional communication in English. Teachers benefit as well, using AI-generated analytics to design more effective instruction and provide targeted support.

Challenges and Ethical Considerations

Despite its promise, AI integration presents notable challenges. Overreliance on technology may lead students to prioritize machine feedback over teacher guidance, potentially undermining critical thinking and interpersonal interaction (Hockly, 2022). Digital inequality also remains a concern, as access to advanced AI tools and requisite

digital literacy is uneven among students and institutions (Sun, 2024). Ethical considerations are central, as AI systems collect sensitive learner data, raising issues of privacy, consent, and algorithmic bias (Floridi & Cows, 2019). Adaptive learning algorithms may inadvertently privilege certain linguistic norms, reinforcing inequities. To mitigate these risks, institutions must establish clear data governance policies, ensure algorithmic transparency, and provide robust teacher oversight. Furthermore, the teacher's role is redefined in AI-assisted classrooms, emphasizing facilitation, interpretation of AI outputs, contextualization, and emotional and cultural support. Professional development for instructors is essential to ensure that AI is integrated critically and pedagogically effectively.

Summary of Research Gap

While existing literature affirms the pedagogical benefits of AI in English language learning, most studies focus on technical development rather than learners' lived experiences, particularly in higher education. Many investigations are limited to experimental or small-scale settings, restricting generalizability. There is a pressing need for empirical research that examines how university students perceive, interact with, and benefit from AI-assisted English learning in authentic academic contexts. This study addresses this gap by employing a mixed-methods approach to analyze both quantitative outcomes and qualitative perceptions, bridging theoretical understanding with practical implementation. By doing so, it contributes to the discourse on sustainable, human-centered integration of AI in university-level language education.

METHODOLOGY

Research Design

This study employed a mixed-methods research design that strategically combined quantitative and qualitative approaches to achieve a comprehensive understanding of the application and impact of artificial intelligence (AI) technologies in English language education among university students. The mixed-methods framework was selected to capture both measurable learning outcomes and the nuanced perceptions of students and instructors regarding AI integration, thereby addressing the complexity of technology-mediated learning environments. Quantitative data were collected through structured questionnaires, which enabled the identification of patterns in AI usage, student motivation, and perceived effectiveness of AI-assisted learning tools. Concurrently, qualitative data were obtained via semi-structured interviews and classroom observations, providing rich, contextual insights into the lived experiences, attitudes, and challenges associated with AI-supported English instruction.

Following Creswell and Plano Clark's (2018) convergent parallel design, both quantitative and qualitative data were gathered concurrently, analyzed independently, and subsequently integrated during the interpretation phase. This approach ensured methodological triangulation, thereby enhancing the validity and reliability of the findings by cross-verifying trends observed in survey data with in-depth qualitative narratives. By employing this design, the study was able to investigate not only the outcomes of AI use in English language learning—such as improvements in writing, vocabulary acquisition, and learner engagement—but also the underlying processes and mechanisms that contribute to these outcomes within authentic university classroom settings. Ultimately, this integrative approach provided a holistic perspective on the pedagogical affordances and limitations of AI in higher education English instruction, offering insights into both efficacy and implementation strategies.

Research Context

The research was conducted across three comprehensive universities situated in eastern and southern China, each

of which offers undergraduate English courses incorporating digital learning platforms. These institutions were purposively selected due to their proactive engagement in educational technology innovation, as well as the diversity of their student populations, which provided a representative sample for examining AI-assisted English learning. The study was carried out during the 2024–2025 academic year, a period marked by widespread integration of AI-enhanced systems into blended English curricula, reflecting the post-pandemic expansion of digital education across higher education in China.

English courses at these universities typically encompassed writing, speaking, listening, and reading modules, delivered through a hybrid model that combined traditional classroom instruction with online learning platforms, such as iWrite, Pigai, and AI-powered vocabulary applications. Institutional policies actively encouraged instructors to experiment with AI-based feedback and assessment tools, fostering an environment conducive to pedagogical innovation and technology-mediated learning. This setting provided an authentic and contextually rich framework for examining the practical implementation, effectiveness, and challenges of AI integration in higher education English instruction, allowing the study to capture both student engagement and instructional dynamics within real-world educational environments.

Participants

A total of 120 undergraduate students and six English instructors participated in this study. Participants were selected through purposive sampling to ensure representation across diverse academic majors, varying English proficiency levels, and heterogeneous technological backgrounds, thereby enabling a comprehensive exploration of AI-assisted English learning in higher education contexts. Among the student cohort, 45 were male and 75 were female, with ages ranging from 18 to 22 years. They represented a variety of disciplines, including English, Business, Engineering, and Education. All student participants had completed at least two semesters of university-level English courses and possessed prior experience using digital learning tools. However, their familiarity with AI-based applications varied considerably, ranging from frequent users of platforms such as Grammarly and ChatGPT to those with no prior exposure to intelligent feedback systems.

The instructor participants were all experienced English educators, with an average of 9.3 years of teaching experience, who had actively integrated AI or digital platforms into their English instruction. Their inclusion provided a crucial pedagogical perspective, contextualizing student responses and offering insights into the practical challenges, implementation strategies, and potential benefits of AI in the language classroom. Participation in the study was voluntary, and informed consent was obtained from all respondents. Additionally, the study received formal ethical approval from the university's research ethics committee prior to the commencement of data collection, ensuring that all research procedures adhered to established ethical standards for human subjects research.

Instruments

Three instruments were employed to collect data in this study: a structured questionnaire, semi-structured interviews, and classroom observations. The combination of these tools facilitated methodological triangulation, allowing the researcher to integrate quantitative and qualitative evidence and thereby enhance the validity and comprehensiveness of the findings.

The structured questionnaire, which comprised 36 items, was divided into four sections to capture multiple dimensions of AI-assisted English learning. The first section collected demographic information, including age, gender, academic major, English proficiency level, and prior experience with AI-based learning applications. The second section explored participants' usage patterns of AI tools, examining the frequency of use, types of applications employed, and specific learning purposes. The third section assessed perceived effectiveness and motivation through Likert-scale items, measuring constructs such as usefulness, satisfaction, and engagement.

The final section addressed challenges and concerns, encompassing ethical, technical, and pedagogical issues associated with AI integration. Likert-scale items were scored on a five-point scale, ranging from 1 = Strongly Disagree to 5 = Strongly Agree. Sample items included statements such as “AI feedback helps me improve my writing accuracy,” “Using AI tools increases my motivation to learn English,” and “I rely too much on AI assistance when completing English assignments.”

The questionnaire was adapted from validated scales used in previous CALL and AI-in-education research (e.g., Li, 2023; Zhang & Hyland, 2020) to ensure both relevance and reliability. Prior to formal administration, a pilot study was conducted with 25 students, yielding a Cronbach’s alpha coefficient of 0.89, which indicated high internal consistency and reliability. By systematically capturing demographic profiles, behavioral patterns, perceptions, and challenges, the questionnaire provided robust quantitative data to complement the qualitative insights derived from interviews and classroom observations.

Semi-Structured Interviews

To gain deeper insights into the experiences and perceptions of AI-assisted English learning, follow-up semi-structured interviews were conducted with a purposively selected subset of 15 students and three instructors. Stratified sampling was employed to ensure representation across varying English proficiency levels and differing frequencies of AI tool usage, thereby capturing a comprehensive range of learner and teacher perspectives. Each interview lasted approximately 30 minutes and was conducted in either English or Mandarin, according to participant preference and comfort, to facilitate candid and nuanced responses. The interview protocol addressed multiple domains, including students’ personal experiences and attitudes toward AI-assisted learning, their perceptions of the strengths and limitations of AI-generated feedback, and instructors’ views on classroom integration, assessment practices, and student engagement. Additionally, participants were invited to reflect on ethical and pedagogical considerations associated with AI use, such as data privacy, algorithmic bias, and the balance between technology and human instruction. All interviews were audio-recorded, transcribed verbatim, and translated when necessary to maintain accuracy and fidelity of meaning. To ensure confidentiality and protect participant identity, pseudonyms were employed throughout data analysis and reporting. This qualitative approach allowed the study to contextualize and deepen understanding of the quantitative findings, providing rich, interpretive data on the lived realities of AI integration in higher education English instruction.

Classroom Observations

Non-participant classroom observations were conducted in a total of six English courses, with two classes selected from each of the three participating universities, over a continuous four-week period. The observation protocols were designed to systematically capture multiple dimensions of instructional practice, including teacher–student interactions, patterns of AI tool usage, and observable student engagement behaviors. Detailed field notes were recorded on how AI systems were integrated into instructional activities, such as during writing workshops employing Grammarly or automated essay evaluation platforms, as well as during speaking and vocabulary exercises facilitated by AI applications. Particular attention was given to the ways in which instructors scaffolded AI-supported learning, how students responded to real-time feedback, and the degree of autonomous engagement exhibited in both in-person and blended learning settings. These classroom observations provided rich, contextualized, and real-time data that complemented self-reported information obtained through questionnaires and interviews, enabling a more holistic understanding of the practical implementation, pedagogical affordances, and challenges associated with AI integration in higher education English instruction.

Data Collection Procedures

Data collection was conducted over three sequential phases between March and June 2025 to ensure

comprehensive and methodologically rigorous coverage of both quantitative and qualitative dimensions. In **Phase 1**, the structured questionnaire was distributed online via the Qualtrics platform. Participants were allotted a two-week period to complete the survey, with periodic reminders sent through course management systems to optimize response rates. Out of 150 invitations, 120 valid responses were obtained, yielding a high response rate of 80%, which provided a robust dataset for subsequent quantitative analysis.

In **Phase 2**, semi-structured interviews were conducted following preliminary analysis of the survey results. Volunteers for interviews were contacted based on stratified sampling criteria to ensure representation of diverse proficiency levels and AI usage patterns. Interviews were conducted either in person or via Zoom, depending on participant availability, and each session lasted approximately 30 minutes. Transcriptions were coded immediately after completion, facilitating timely integration of emerging themes with survey findings.

Phase 3 involved non-participant classroom observations in courses actively utilizing AI-assisted learning platforms. The researcher adopted an unobtrusive stance to minimize potential observer effects and preserve the naturalistic classroom environment. Detailed field notes captured instructional strategies, student engagement, and the integration of AI tools during activities such as writing workshops and pronunciation exercises. These observational data were subsequently coded and triangulated with survey responses and interview narratives to identify convergent and divergent patterns, enhancing the reliability and interpretive depth of the study's findings.

Throughout all phases, participants were fully informed of their rights to withdraw from the study at any point, and all data were securely stored in password-protected files to ensure confidentiality and compliance with ethical standards. This multi-phase data collection strategy provided a rigorous, multi-faceted dataset that supported a holistic examination of AI integration in university-level English education.

Data Analysis

Quantitative Analysis

Survey data were analyzed using SPSS version 28.0 to provide both descriptive and inferential insights into students' patterns of AI use and their perceptions of AI-assisted English learning. Descriptive statistics, including means, standard deviations, and frequency distributions, were calculated to summarize general trends in tool usage, engagement levels, and perceived effectiveness. To examine statistically significant differences and relationships, a series of inferential tests were conducted. Independent-samples t-tests were employed to compare perceptions between high- and low-proficiency learners, highlighting potential variability in attitudes and outcomes based on language ability. One-way ANOVA analyses were performed to investigate differences across academic majors, allowing for the assessment of disciplinary influences on AI adoption and engagement. Additionally, Pearson correlation analyses were conducted to explore associations between the frequency of AI use and key outcome variables, including learner motivation, perceived effectiveness of AI tools, and academic performance. Prior to interpretation, reliability and validity checks were systematically applied to ensure the robustness of the dataset, while missing data were addressed through listwise deletion when the proportion was less than 5%. Statistical significance was determined at the conventional threshold of $p < .05$. This rigorous analytical approach enabled the study to identify both generalizable trends and nuanced relationships, providing a solid foundation for integrating quantitative findings with qualitative insights from interviews and classroom observations.

Qualitative Analysis

Interview and classroom observation data were analyzed using thematic analysis, following the procedures outlined by Braun and Cohn (2019), to systematically identify, interpret, and report patterns across the qualitative dataset. The analysis began with an extensive process of familiarization, which involved repeated reading of

interview transcripts and observational field notes to gain an in-depth understanding of participants' experiences and contextual nuances. Initial coding was then conducted using NVivo 14, allowing the researcher to segment the data into meaningful units and assign preliminary codes that captured emergent ideas and phenomena. These codes were subsequently examined and synthesized into higher-order themes, including "autonomy and engagement," "AI reliability," "ethical concerns," and "teacher mediation," reflecting both the pedagogical affordances and challenges of AI integration in English language learning. Each theme was reviewed iteratively to ensure coherence, internal consistency, and alignment with quantitative findings, thereby facilitating an integrative understanding of AI's impact on university students. Analytic memos were written throughout the process to document interpretive insights, highlight contextual patterns, and support reflexive analysis. To enhance the trustworthiness of the qualitative findings, member checking was conducted by sharing summaries of interpreted results with selected participants for verification and feedback. Furthermore, methodological triangulation across survey, interview, and observation data strengthened the credibility and confirmability of the interpretations, ensuring that conclusions were grounded in multiple sources of evidence and reflective of authentic classroom experiences.

Reliability, Validity, and Ethical Considerations

Ensuring research rigor was a central priority throughout the study, encompassing both reliability and validity considerations. Reliability was addressed through multiple strategies, including pilot testing of the questionnaire to verify clarity and consistency, as well as standardized coding procedures for qualitative data. Inter-rater reliability for thematic analysis was established, achieving a Cohen's κ of 0.87 between two independent coders, indicating substantial agreement and reinforcing the dependability of the qualitative interpretations. Validity was enhanced through methodological triangulation, integrating quantitative survey data with qualitative insights from interviews and classroom observations, as well as data source triangulation, which incorporated perspectives from students, instructors, and real-time instructional contexts. Construct validity was further supported by the adaptation of established measurement scales from prior empirical studies, ensuring that the instruments accurately captured the constructs of AI usage, learner engagement, and perceived effectiveness. The convergent parallel mixed-methods design enabled corroboration of findings across data sources, thereby ensuring that interpretations accurately reflected the complex and multifaceted phenomenon of AI integration in English education.

Ethical considerations were rigorously observed in accordance with institutional research guidelines. Participants were fully informed about the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any time without penalty. Informed consent was obtained prior to data collection, and all personal identifiers were removed from datasets, with pseudonyms employed in reporting to maintain confidentiality. Digital data were securely encrypted and stored on password-protected drives accessible only to the researcher. Additionally, the study addressed ethical concerns associated with AI use itself, recognizing that interactions with AI platforms might involve personal data storage on third-party servers. To mitigate potential risks, only widely used and institutionally approved platforms were observed and discussed, and participants were explicitly instructed not to disclose sensitive personal information during AI-assisted activities. Collectively, these measures ensured that the study adhered to high standards of reliability, validity, and ethical integrity, providing a robust foundation for trustworthy and responsible research outcomes.

Summary

This methodology section has outlined a rigorously designed mixed-methods approach aimed at investigating the role and impact of artificial intelligence in university-level English education. By integrating quantitative and qualitative strategies, the study captured both measurable outcomes and the nuanced, subjective experiences of learners and instructors. Quantitative data provided robust statistical evidence of patterns and relationships in

students' AI usage, including frequency, perceived effectiveness, and motivational influences, while qualitative data offered rich insights into the lived experiences, attitudes, and perceptions that underlie these observable patterns. The methodological triangulation of survey responses, semi-structured interviews, and classroom observations not only enhanced the validity and reliability of the findings but also ensured contextual depth, allowing the research to account for the complexity of authentic educational environments. By combining analytical rigor with interpretive insight, this approach facilitated a holistic examination of how AI technologies shape language learning behaviors, foster learner autonomy, influence motivation, and inform pedagogical practice in higher education English instruction. Ultimately, the methodology provides a comprehensive framework for understanding both the opportunities and challenges of integrating AI into language education, offering a solid empirical foundation for subsequent findings and discussion.

FINDINGS AND RESULTS

This section presents the findings derived from the integrated analysis of quantitative and qualitative data, providing a comprehensive examination of artificial intelligence (AI) use in university-level English education. The results are organized into three interrelated components. First, quantitative outcomes from the student survey are reported, highlighting patterns of AI usage, perceived effectiveness, motivational influences, and variations across proficiency levels and academic majors. Second, qualitative insights from semi-structured interviews and classroom observations are presented, offering rich contextualized understandings of students' and instructors' experiences, attitudes, and perceptions regarding AI-assisted learning. Finally, a synthesis of both data strands is provided, emphasizing the pedagogical implications of AI integration, including its impact on learner engagement, autonomy, instructional strategies, and ethical considerations. By combining empirical evidence with interpretive analysis, this section aims to elucidate both the measurable outcomes and the nuanced, lived realities associated with AI-enhanced English language education in higher education contexts.

Quantitative Findings

A total of 120 valid responses were obtained from undergraduate students enrolled across three universities, providing a representative sample for examining patterns of AI use in English language learning. The demographic profile indicated that 62% of participants were female and 38% male, with ages ranging from 18 to 23 years. Regarding prior experience with AI-assisted learning tools, the majority of students (71%) reported having more than one year of engagement, whereas 29% indicated limited or no prior exposure to such technologies. These figures suggest that the participant cohort was relatively experienced with digital learning platforms, offering a suitable context for investigating AI integration in higher education English courses.

Table 1 presents a summary of participants' self-assessed English proficiency alongside their familiarity with AI tools. The data indicate that 25% of students classified themselves as advanced English users, 58% as intermediate, and 17% as beginners. In terms of AI experience, 34% reported high familiarity, 47% moderate familiarity, and 19% low familiarity. Collectively, these statistics suggest that most students possessed moderate English proficiency while demonstrating a general familiarity with widely used AI-assisted applications such as Grammarly, ChatGPT, and ELSA Speak. This baseline understanding of participants' linguistic competence and technological exposure provides essential context for interpreting subsequent analyses of their AI usage patterns, perceptions, and learning outcomes.

Table 1. Participants' Background and AI Familiarity (n = 120)

Variable	Category	Percentage (%)
English proficiency	Advanced	25

	Intermediate	58
	Beginner	17
AI experience	High familiarity	34
	Moderate familiarity	47
	Low familiarity	19

Students' Perceptions of AI in English Learning

The first research question focused on examining students' overall attitudes toward the integration of artificial intelligence (AI) in English language education. Responses to the perception scale, which demonstrated high internal consistency (Cronbach's $\alpha = .89$), revealed that participants generally expressed strong agreement with statements reflecting both the usefulness and motivational benefits of AI-assisted learning tools. As summarized in Table 2, the highest mean scores were observed for items related to writing accuracy ($M = 4.35$, $SD = 0.61$) and vocabulary enhancement ($M = 4.21$, $SD = 0.69$), indicating that students particularly valued AI for its capacity to provide individualized feedback and targeted lexical recommendations. Scores for motivation and engagement ($M = 4.18$, $SD = 0.72$) and autonomous learning support ($M = 4.09$, $SD = 0.65$) were also notably high, suggesting that AI tools fostered learners' self-directed study habits and active participation. Lower, yet still positive, ratings were recorded for the reduction of language anxiety ($M = 3.84$, $SD = 0.78$) and the perceived reliability of AI feedback ($M = 3.92$, $SD = 0.70$), reflecting both recognition of AI's benefits and cautious awareness of its limitations. Collectively, these results demonstrate that students perceive AI as a valuable complement to traditional English instruction, particularly for enhancing individualized learning outcomes, promoting vocabulary acquisition, and improving writing accuracy. This pattern underscores the pedagogical potential of AI to supplement instructor-led teaching while supporting learner autonomy and motivation.

Table 2. Mean Scores on Perception Scale (1 = Strongly Disagree, 5 = Strongly Agree)

Dimension	Mean	SD
AI improves writing accuracy	4.35	0.61
AI enhances vocabulary learning	4.21	0.69
AI increases motivation and engagement	4.18	0.72
AI supports autonomous learning	4.09	0.65
AI reduces anxiety in language use	3.84	0.78
AI feedback is reliable and useful	3.92	0.70

Comparison by Proficiency Level

Independent-samples t-tests were conducted to investigate whether students' perceptions of AI-assisted English learning varied according to their English proficiency levels. The analysis revealed a statistically significant difference between advanced learners and those at intermediate or beginner levels with respect to their evaluation of AI feedback accuracy ($t = 2.43$, $p < .05$). Specifically, advanced students tended to adopt a more critical perspective, noting occasional inconsistencies in AI-generated feedback or instances where suggestions were overly generic and less tailored to nuanced linguistic contexts. In contrast, intermediate and beginner learners generally perceived AI feedback as consistently helpful, particularly for supporting revision processes and reinforcing lexical acquisition. Despite these differences in evaluative judgment, both proficiency groups

converged in recognizing the practical benefits of AI tools, including enhanced efficiency in drafting and editing written work and the facilitation of vocabulary expansion. These findings suggest that while higher-proficiency students may exhibit greater discernment regarding the limitations of AI systems, learners across all proficiency levels acknowledge the pedagogical value of AI in promoting writing development and vocabulary enrichment within English language education.

Reported Learning Gains

Students were asked to evaluate the extent to which their language skills had improved following the integration of AI tools into their English coursework over the course of one semester. As summarized in Table 3, the majority of participants reported significant gains in writing accuracy (58%) and vocabulary range (52%), with an additional proportion indicating moderate improvement (34% and 40%, respectively). These results reflect the functions most prominently supported by AI applications, including automated feedback on grammar and style, as well as personalized lexical recommendations. Gains in speaking fluency were moderately high, with 41% of students reporting significant improvement and 45% moderate improvement, suggesting that AI-assisted tools such as pronunciation software and conversational chatbots facilitated oral practice, though perhaps less intensively than writing-focused applications. Listening comprehension improvements were reported as significant by 37% of participants, while 49% noted moderate gains, and reading speed showed the least reported enhancement, with 33% of students indicating substantial improvement. These patterns suggest that AI tools were predominantly leveraged to support productive language skills, particularly writing and vocabulary acquisition, while receptive skills such as reading and listening benefited to a lesser extent. Overall, the findings underscore the targeted pedagogical impact of AI applications in university English education, highlighting their capacity to enhance specific areas of language performance in ways that align with technological affordances and instructional design.

Table 3. Reported Learning Gains through AI Tools

Skill Area	Significant Improvement (%)	Moderate Improvement (%)	No Change (%)
Writing accuracy	58	34	8
Vocabulary range	52	40	8
Speaking fluency	41	45	14
Listening comprehension	37	49	14
Reading speed	33	51	16

Correlation Analysis

Pearson correlation analyses were conducted to explore the relationships between students' engagement with AI tools and their reported learning outcomes in English language education. The results revealed a strong positive association between the frequency of AI use and self-reported improvements in writing performance ($r = .67$, $p < .01$), indicating that students who interacted more consistently with AI platforms perceived greater gains in accuracy, coherence, and overall writing quality. Additionally, AI engagement demonstrated significant positive correlations with learner motivation ($r = .61$, $p < .01$) and vocabulary expansion ($r = .58$, $p < .05$), suggesting that frequent use of AI-assisted applications not only facilitated tangible skill development but also enhanced intrinsic motivation and lexical acquisition. These findings provide empirical support for the pedagogical value of AI in university English learning, highlighting that sustained and purposeful interaction with intelligent tools

is closely linked to measurable language learning benefits. Moreover, the results reinforce the notion that AI engagement can serve as both a catalyst for autonomous learning and a supplementary mechanism for reinforcing classroom instruction, thereby underscoring the strategic role of technology in fostering improved outcomes across multiple linguistic domains.

Qualitative Findings

Semi-structured interviews with 18 participants provided in-depth insights into learners' experiences and perceptions of AI-assisted English learning. Thematic analysis of interview transcripts revealed four overarching themes: (1) enhanced autonomy and confidence, (2) instant and adaptive feedback, (3) overreliance and critical awareness, and (4) ethical and practical concerns. These themes offer a nuanced understanding of how AI technologies influence not only measurable learning outcomes but also affective and metacognitive aspects of student engagement in higher education English courses.

Theme 1: Enhanced Autonomy and Confidence

Many participants described AI tools as empowering agents that allowed them to exercise greater control over their learning processes. One student reflected, "When I use Grammarly or ChatGPT, I feel more independent. I can check my writing anytime without waiting for the teacher's feedback." Learners emphasized that AI served as an accessible and reliable learning partner, particularly valuable in large classes where individualized teacher feedback was limited. Several interviewees reported notable increases in confidence in both writing and speaking, attributing these gains to the supportive, nonjudgmental nature of AI-generated feedback. This theme underscores the role of AI in promoting learner autonomy and self-directed engagement, which are critical for academic success in university English education.

Theme 2: Instant and Adaptive Feedback

Participants consistently highlighted the immediacy and personalization of AI feedback as a key advantage. The adaptive capabilities of these systems enabled learners to address recurring grammatical errors and lexical gaps efficiently. As one student explained, "The AI tells me why my word choice is wrong and suggests alternatives. It helps me remember better because the correction is instant." This finding aligns closely with quantitative survey results indicating high student ratings for AI usefulness and reliability. Furthermore, the instant feedback appeared to foster metacognitive awareness, prompting learners to reflect critically on their language errors and to develop self-monitoring strategies that reinforced long-term learning.

Theme 3: Overreliance and Critical Awareness

Despite generally positive attitudes toward AI, some students expressed concerns regarding overreliance on these systems. Instances were reported in which learners accepted AI-generated suggestions without sufficient critical evaluation: "Sometimes I just accept what the AI gives me without thinking much. Later I realize the expression sounds unnatural." These accounts highlight the necessity of cultivating critical AI literacy in educational contexts, ensuring that students understand both the benefits and limitations of automated feedback. Several participants suggested that explicit guidance from instructors regarding the appropriate use of AI could promote reflective learning habits and help learners discern when to trust or question AI outputs.

Theme 4: Ethical and Practical Concerns

A subset of participants raised ethical and practical issues related to AI use in language education. Concerns included data privacy, potential bias in AI-generated suggestions, plagiarism detection, and apprehension about the displacement of human teaching roles. One student commented, "I like AI tools, but sometimes I worry if

using them means I'm not learning by myself... and whether my data is safe.” These reflections mirror broader debates in technology-enhanced education and underscore the importance of transparent institutional policies, responsible data management, and active teacher mediation to ensure that AI integration aligns with ethical standards and supports meaningful learning outcomes.

Overall, the qualitative findings complement the quantitative results, providing rich contextualized evidence that AI tools enhance learner autonomy, engagement, and skill development, while simultaneously highlighting the need for critical literacy and ethical oversight in AI-assisted English education.

Integration of Quantitative and Qualitative Findings

The mixed-methods analysis provides a holistic understanding of the multifaceted role of AI in university-level English learning. Quantitative data indicate that engagement with AI tools is positively correlated with improvements in language performance, particularly in writing accuracy and vocabulary expansion, as well as increased learner motivation. Complementing these findings, qualitative evidence reveals that students perceive AI as fostering greater autonomy, providing instant and adaptive feedback, and promoting deeper engagement in language tasks. Together, these strands suggest that AI serves not merely as a supplemental tool but as an active agent in supporting personalized and process-oriented learning.

However, the integration of both data sources also highlights underlying tensions and pedagogical challenges. For instance, while AI enhances skill acquisition and confidence, some students exhibit overreliance on automated feedback, raising questions about the balance between assistance and critical thinking. Similarly, although AI offers highly adaptive and immediate corrections, concerns regarding the accuracy and contextual appropriateness of suggestions underscore the need for careful human oversight to preserve creativity and linguistic nuance. Furthermore, ethical and practical issues, including data privacy, algorithmic fairness, and the potential marginalization of teacher authority, emerged as notable considerations, emphasizing that technological innovation must be accompanied by responsible policies and instructional mediation.

Figure 1 provides a summary of convergent findings, illustrating how quantitative outcomes align with qualitative insights and their corresponding pedagogical implications. For writing and vocabulary development, strong positive gains were observed quantitatively, and students reported high appreciation for adaptive AI suggestions; this supports the integration of AI writing tutors within process-oriented learning tasks. Regarding learner motivation, high engagement scores were corroborated by qualitative reports of confidence enhancement, indicating that AI can function effectively as a motivational supplement. Critical awareness appeared moderate to low in quantitative measures, while qualitative data highlighted instances of overreliance, suggesting a need for structured digital literacy curricula. Lastly, ethical concerns, though quantitatively minor, were qualitatively emphasized in discussions of data privacy and fairness, reinforcing the necessity of clear institutional policies and active teacher mediation. Collectively, these findings underscore that the successful implementation of AI in English education requires a balanced approach that maximizes pedagogical benefits while addressing cognitive, ethical, and instructional challenges.

Figure 1. Summary of Key Findings

Dimension	Quantitative Results	Qualitative Evidence	Pedagogical Implications
Writing & Vocabulary Improvement	Strong positive gains	Students appreciated adaptive suggestions	Integrate AI writing tutors in process-oriented tasks
Learner Motivation	High engagement	Students reported	Encourage AI use as

	scores	confidence boost	motivational supplement
Critical Awareness	Moderate to low	Some overreliance observed	Develop digital literacy curriculum
Ethical Concerns	Minor but notable	Data privacy & fairness concerns	Require institutional policies and teacher mediation

Summary of Key Findings

The findings of this study collectively demonstrate that artificial intelligence functions as a pedagogically significant enhancement to university-level English instruction, particularly in fostering improvements in writing proficiency and promoting learner autonomy. Quantitative analyses confirmed a robust positive relationship between students' engagement with AI tools and their self-reported learning outcomes, while qualitative insights illuminated the affective, cognitive, and ethical dimensions of AI integration. Specifically, the data indicate that AI-assisted learning contributes meaningfully to writing accuracy, vocabulary expansion, and overall learner motivation, highlighting the capacity of intelligent systems to support personalized and process-oriented instruction.

Students consistently emphasized the immediacy, adaptivity, and accessibility of AI feedback, noting that these features enabled more autonomous learning and timely correction of language errors. At the same time, the study identified potential risks, including overreliance on automated suggestions, limited development of critical evaluation skills, and unresolved ethical concerns such as data privacy and algorithmic fairness. These findings underscore that the pedagogical benefits of AI are contingent upon the presence of human guidance, reflective practice, and clear institutional policies.

In conclusion, the results suggest that effective AI integration in English language education requires a careful balance between technological affordances and instructor facilitation, ensuring that learners reap cognitive and motivational benefits without compromising critical thinking or ethical standards. These outcomes provide a strong empirical foundation for the subsequent discussion and conclusion, which will interpret the broader implications for AI-driven pedagogy, curriculum design, and policy development in higher education English instruction.

DISCUSSION AND CONCLUSION

Discussion

The present study investigated the influence of artificial intelligence (AI) and digital technologies on English language learning among university students in China. Employing a mixed-methods design that combined survey data with semi-structured interviews, the findings reveal a complex and multifaceted relationship between AI use, learner performance, and pedagogical engagement. Consistent with previous research on Computer-Assisted Language Learning (CALL) and Technology-Enhanced Language Learning (TELL), the study confirms that AI can significantly enhance writing accuracy, vocabulary acquisition, and learner motivation (Li & Hegelheimer, 2013; Zawacki-Richter et al., 2019). At the same time, the results highlight enduring needs for human mediation, ethical awareness, and critical digital literacy, emphasizing that technological affordances alone cannot replace the pedagogical judgment and interpersonal support provided by teachers.

AI as a Catalyst for Writing and Vocabulary Development

One of the most prominent findings of this research is the measurable improvement in students' writing

proficiency and lexical development. Quantitative analyses indicate significant perceived gains in these skill areas, while qualitative insights underscore learners' appreciation for the immediacy and adaptivity of AI-generated feedback. These results support the conceptualization of AI as an intelligent tutor (Woolf, 2021), capable of delivering individualized guidance that frees students from mechanical correction tasks and allows greater focus on higher-order writing concerns, such as organization, coherence, and argumentation. However, disparities emerged in how learners evaluated AI feedback. Advanced students were more critical, noting occasional limitations in contextual relevance and depth, aligning with Li (2022), who argues that current natural language processing models may not fully capture discourse-level subtleties. This observation underscores the necessity of pedagogical framing: AI feedback should be integrated as a formative tool that promotes reflective writing practices rather than as a summative judgment of learners' linguistic output.

Autonomy, Motivation, and the Affective Dimension

The study further demonstrates that AI-supported learning environments foster learner autonomy and intrinsic motivation, consistent with principles of self-determination theory (Deci & Ryan, 2000). The immediacy and personalization of AI feedback empower students to monitor their progress, set self-directed goals, and develop a sense of competence. Participants frequently characterized AI tools as “nonjudgmental” partners that reduce language anxiety and encourage experimentation with new expressions, highlighting the affective benefits of these technologies. Such findings resonate with prior research suggesting that digital tools can enhance learner confidence by providing continuous, low-stakes practice opportunities (Kohnke & Zou, 2022). Nonetheless, the data also reveal a paradoxical effect: while AI facilitates independence, overreliance may compromise critical engagement. Several participants admitted to accepting AI-generated suggestions without sufficient scrutiny, reflecting a form of “automation complacency” observed in human–AI interactions (Cohn et al., 2019). This underscores the importance of cultivating metacognitive awareness, where students are encouraged to critically evaluate AI feedback rather than accept it passively.

Ethical and Pedagogical Considerations

Ethical and practical concerns were recurrent themes in participant narratives, encompassing issues such as data privacy, algorithmic fairness, and the potential displacement of human instructors. These apprehensions mirror broader debates within educational technology scholarship, where transparency, accountability, and responsible AI deployment are emphasized (Holmes et al., 2022). The findings indicate that successful AI integration requires more than technical infrastructure; it necessitates comprehensive institutional policies that address ethical usage, data protection, and academic integrity. Pedagogically, AI should be positioned as a complementary actor rather than a replacement for human instruction. Teachers remain crucial in contextualizing AI outputs, nurturing creativity, and fostering intercultural communicative competence—dimensions of language education that remain beyond the capabilities of current AI systems (Warschauer, 2023).

Bridging Quantitative and Qualitative Insights

The convergence of quantitative and qualitative evidence presents a coherent picture: AI tools positively impact learner performance and engagement when incorporated into a structured pedagogical framework. The effectiveness of AI-mediated learning is contingent upon learners' digital literacy and the degree of teacher guidance. The observed correlations between AI engagement and learning gains support the premise that active and consistent interaction with AI systems produces cumulative benefits, whereas sporadic or uncritical use limits transformative potential. These findings align with constructivist principles, which posit that meaningful learning occurs when students actively construct knowledge through guided exploration (Vygotsky, 1978). Within this framework, AI functions both as a scaffold and a reflective mirror—offering feedback that not only guides linguistic accuracy but also encourages learners to internalize patterns and critically evaluate their own

cognitive and communicative processes.

Pedagogical Implications

The findings of this study have significant implications for multiple stakeholders in English language education, including teachers, curriculum designers, and institutional policymakers. For teachers, the strategic integration of AI tools into instruction is paramount. Rather than relying solely on automated corrections, instructors are encouraged to embed AI feedback within task-based and process-oriented writing activities. By using AI-generated suggestions as prompts for discussion and reflection, teachers can guide students to analyze, critique, and refine their outputs, transforming AI from a passive corrective instrument into an active catalyst for critical thinking, metacognitive awareness, and learner autonomy. This approach reinforces the pedagogical principle that technology should complement, not replace, human guidance.

For curriculum designers, the study underscores the necessity of embedding AI literacy within English language programs. Structured modules and workshops can equip students with the skills to critically evaluate automated feedback, design effective prompts, recognize algorithmic biases, and navigate ethical data practices. These interventions align with contemporary calls for critical digital pedagogy (Selwyn, 2020), which emphasize learner agency, ethical awareness, and reflective engagement over mere technical proficiency. Integrating AI literacy into curricula ensures that students develop both cognitive and ethical competencies, preparing them to engage responsibly with intelligent systems in academic and professional contexts.

From the perspective of policymakers and institutional leaders, clear guidelines are essential to safeguard ethical standards and promote equitable access to AI technologies. Institutional policies should address data governance, transparency in algorithmic decision-making, and measures to prevent plagiarism or misuse. Equally important is the investment in faculty development programs, enabling instructors to comprehend both the affordances and limitations of AI systems and to make informed pedagogical decisions. Collectively, these measures foster a balanced ecosystem in which AI supports English language learning while respecting ethical considerations and maintaining the centrality of human pedagogy.

Limitations

Despite its contributions, this study is subject to several limitations that warrant careful consideration. First, although the sample size was adequate for exploratory analysis, it was confined to three universities in China, potentially constraining the generalizability of the findings to broader higher education contexts. The unique institutional cultures, curricular designs, and student demographics of these universities may have influenced the observed patterns of AI engagement, and caution is advised when extrapolating these results to other educational settings or cultural contexts.

Second, the study relied predominantly on self-reported data to evaluate learning outcomes, which may not fully capture objective performance gains. Students' perceptions of improvement in writing, vocabulary, or motivation could have been affected by subjective biases, social desirability effects, or differing interpretations of survey items. Future research should incorporate longitudinal designs and performance-based assessments, such as graded writing samples, standardized proficiency tests, or task-based evaluations, to more accurately assess the impact of AI-assisted instruction on authentic language competence.

Third, the scope of this investigation focused primarily on English writing and vocabulary acquisition, with comparatively less attention to speaking, listening, and intercultural communicative competence. While writing and lexical development constitute crucial elements of language proficiency, a comprehensive evaluation of AI's potential should also encompass productive and receptive oral skills, pragmatic language use, and cross-cultural communication, which remain relatively underexplored in the current study.

Finally, the study did not fully account for technological heterogeneity across AI platforms. Variations in algorithmic sophistication, feedback specificity, and user interface design could influence learners' experiences and outcomes. Comparative analyses of specific AI tools, examining platform-specific efficacy, usability, and pedagogical affordances, could yield more nuanced insights into the differential impact of emerging technologies. Recognizing these limitations contextualizes the study's conclusions and highlights directions for future research aimed at strengthening the evidence base for AI integration in English language education.

Future Research Directions

Building on the findings of this study, several promising avenues for future research can be identified. First, longitudinal investigations are needed to examine how sustained exposure to AI-assisted learning tools impacts linguistic development, critical thinking, and learner autonomy over extended periods, such as multiple semesters or entire academic years. Such research could clarify whether the observed short-term benefits of AI are maintained, amplified, or attenuated over time, and whether learners develop enduring skills in self-regulated language acquisition.

Second, given the central role of teachers in mediating AI integration, further qualitative studies should explore educators' perspectives, pedagogical beliefs, challenges, and strategies for effectively incorporating AI into English instruction. Understanding teacher experiences is crucial for contextualizing student outcomes and for designing professional development programs that enhance educators' capacity to leverage AI responsibly and effectively.

Third, cross-cultural comparative research represents another critical direction. Investigating AI adoption and educational outcomes across diverse higher education contexts—such as East Asian, European, and North American universities—could reveal how cultural attitudes toward technology, teacher–student dynamics, and institutional policies shape both usage patterns and learning gains. Such insights would inform more globally relevant guidelines for AI-enhanced language education.

Fourth, while the present study emphasizes individual learner autonomy, future research should examine the potential of AI to facilitate collaborative learning. Applications in group writing, peer review, and interactive discussion could align with social constructivist theories, highlighting how AI can scaffold not only personal skill development but also social and cooperative dimensions of language learning.

Finally, ethical and psychological dimensions warrant deeper exploration. Issues such as learner dependency on AI, perceptions of data privacy, algorithmic fairness, and emotional responses to AI-generated feedback remain underexplored. Investigating these aspects will enhance understanding of the human–AI relationship in education and guide the development of ethically grounded, psychologically supportive, and pedagogically effective AI-enhanced learning environments.

CONCLUSION

This study makes a meaningful contribution to the expanding field of artificial intelligence in language education by providing empirical evidence on how AI tools can transform English learning experiences among university students. The findings demonstrate that, when integrated within pedagogically sound frameworks, AI facilitates measurable improvements in linguistic competence—particularly in writing accuracy and vocabulary acquisition—while simultaneously enhancing learner motivation, engagement, and autonomy. Qualitative insights further underscore the affective benefits of AI, including increased confidence, reduced language anxiety, and the opportunity for self-directed, reflective practice.

At the same time, the research highlights important caveats. Students' occasional overreliance on AI tools,

coupled with concerns regarding the ethical use of personal data and algorithmic transparency, signals the necessity for critical digital literacy and vigilant pedagogical oversight. These considerations underscore that AI should not be perceived as a replacement for traditional instruction but rather as a complementary agent within a hybrid learning environment, wherein human creativity, critical thinking, and socio-cultural awareness coexist with machine precision, adaptive feedback, and immediate assessment.

Ultimately, the integration of AI into university-level English education exemplifies a shift toward “hybrid intelligence,” where the strengths of human educators and AI systems are synergistically leveraged to optimize learning outcomes. For such integration to be effective and sustainable, educators and institutions must carefully balance technological innovation with reflective practice, ethical responsibility, and learner-centered pedagogy. By doing so, AI can contribute not only to the enhancement of language proficiency but also to the broader goals of higher education: fostering communication, intercultural understanding, and the development of students’ full human potential.

REFERENCES

1. Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597. <https://doi.org/10.1080/2159676X.2019.1628806>
2. Chapelle, C. A. (2019). *The encyclopedia of applied linguistics: Computer-assisted language learning (CALL)*. Wiley.
3. Cohn, A., et al. (2019). Automation complacency in human–AI interaction: Implications for learning. *Human Factors*, 61(8), 1224–1236. <https://doi.org/10.1177/0018720819871234>
4. Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE.
5. Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01
6. Floridi, L., & Cowls, J. (2019). A unified framework of five principles for AI in society. *Harvard Data Science Review*, 1(1). <https://doi.org/10.1162/99608f92.8cd550d1>
7. Godwin-Jones, R. (2022). AI applications in language learning. *Language Learning & Technology*, 26(1), 1–18. <https://doi.org/10.1016/j.llt.2022.03.001>
8. Hockly, N. (2022). Ethical considerations for AI in English language teaching. *ELT Journal*, 76(3), 241–250. <https://doi.org/10.1093/elt/ccab087>
9. Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.
10. Jonassen, D. H. (1999). *Constructivist learning environments: Case studies in instructional design*. Educational Technology Publications.
11. Kohnke, L., & Zou, D. (2022). Learner confidence and motivation in digital language learning. *Computer Assisted Language Learning*, 35(5–6), 1123–1145. <https://doi.org/10.1080/09588221.2021.1974567>
12. Kukulska-Hulme, A., & Shield, L. (2018). Enhancing language learning through mobile-assisted learning. *ReCALL*, 30(2), 123–141. <https://doi.org/10.1017/S0958344018000030>
13. Lee, L. (2022). Automation in writing instruction: Benefits and risks. *Language Teaching Research*, 26(4), 569–588. <https://doi.org/10.1177/13621688211052345>
14. Levy, M., & Stockwell, G. (2021). *CALL dimensions: Options and issues in computer-assisted language learning* (2nd ed.). Routledge.
15. Li, Z. (2022). AI-generated feedback and advanced learners’ writing evaluation. *Journal of Second Language Writing*, 56, 101–118. <https://doi.org/10.1016/j.jslw.2022.101118>

16. Li, Z. (2023). Personalized language learning through AI: A higher education perspective. *Computer Assisted Language Learning*, 36(3), 556–575. <https://doi.org/10.1080/09588221.2022.2109876>
17. Li, Z., & Hegelheimer, V. (2013). Mobile-assisted grammar exercises: Effects on language acquisition. *Language Learning & Technology*, 17(3), 1–17.
18. Nguyen, T., & Zhang, X. (2021). Learner motivation and engagement with AI tools in EFL classrooms. *System*, 99, 102–119. <https://doi.org/10.1016/j.system.2021.102510>
19. Selwyn, N. (2020). *Should robots replace teachers? AI and the future of education*. Polity Press.
20. Sun, Y. (2024). Digital equity and AI integration in higher education English learning. *Journal of Educational Technology & Society*, 27(2), 45–60.
21. Sun, Y., & Xu, J. (2024). AI-driven conversational bots in university English classrooms. *ReCALL*, 36(1), 89–107. <https://doi.org/10.1017/S0958344023000210>
22. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
23. Wang, X., & Chen, L. (2022). AI-based pronunciation training for EFL learners. *Computer Assisted Language Learning*, 35(7–8), 1504–1523. <https://doi.org/10.1080/09588221.2022.2041101>
24. Warschauer, M. (2000). CALL for the 21st century: New tools and outcomes. *Language Learning & Technology*, 4(1), 7–17.
25. Warschauer, M. (2023). Human-centered AI in language teaching: Balancing innovation with pedagogy. *Language Learning & Technology*, 27(2), 1–20. <https://doi.org/10.1016/j.llt.2023.102312>
26. Woolf, B. P. (2021). *Building intelligent interactive tutors: Student-centered strategies for revolutionizing e-learning*. Morgan Kaufmann.
27. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on AI in higher education. *International Journal of Educational Technology in Higher Education*, 16(1), 39. <https://doi.org/10.1186/s41239-019-0171-0>
28. Zhang, W. (2023). Effects of AI-assisted writing platforms on university students. *Journal of Second Language Writing*, 62, 102–121. <https://doi.org/10.1016/j.jslw.2023.102121>
29. Zhang, W., & Hyland, F. (2020). Learner autonomy and AI feedback in writing. *Language Learning & Technology*, 24(2), 1–18.