

AI-Enhanced English Teaching in Vocational Undergraduate Education: Opportunities, Challenges, and Pedagogical Strategies

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Abstract: Artificial Intelligence (AI) is increasingly transforming vocational undergraduate education, reshaping how English is taught, learned, and assessed. English instruction in this context faces the dual task of developing students' linguistic competence and learning capacity in digital literacy. Integrating AI offers opportunities for personalized learning, adaptive assessment, and immersive language practice, yet also poses challenges in pedagogy, technology, and ethics. This paper examines AI-enhanced English teaching, drawing on recent research and case studies. Key affordances include adaptive learning systems, automated feedback, and vocationally relevant language practice, while barriers involve limited digital infrastructure, teachers' AI literacy, and concerns over data privacy and equity. To address these issues, a human–AI collaborative framework is proposed, emphasizing competence-oriented, task-based, and ethically guided teaching. Findings highlight that effective AI integration requires rethinking the pedagogical ecosystem, with teachers evolving from knowledge transmitters to learning facilitators and AI collaborators. Sustainable implementation depends on coordinated teacher training, curriculum redesign, ethical governance, and institutional support. This study contributes to the discourse on digital transformation in vocational education and offers practical strategies for optimizing AI-assisted English instruction under the “smart vocational education” framework.

Keywords: Artificial Intelligence; Vocational Undergraduate Education; Digital Literacy; English Teaching; Human–AI Collaboration; Pedagogy

1. Introduction

In recent years, Artificial Intelligence (AI) has

rapidly permeated various sectors of society, including education, bringing about profound changes in teaching and learning practices. From intelligent tutoring systems and automated writing evaluation to voice recognition and learning analytics, AI technologies have revolutionized how learners acquire knowledge and interact with learning content. Within higher education, and particularly in vocational undergraduate programs, AI has the potential to bridge the gap between academic English education and the practical, skill-oriented demands of the modern workplace[1].

Vocational undergraduate English teaching diverges distinctly from general higher education, with its core orientation rooted in industry-aligned practicality, vocational scenario integration, and career competitiveness. Unlike their counterparts in academic universities, students here are not merely required to master foundational language skills, but to apply English with precision in occupation-specific contexts—such as technical documentation translation in intelligent manufacturing, cross-border e-commerce negotiation, engineering project communication, or modern service industry scenarios like high-end hospitality and aviation services. However, current English teaching practices in many vocational undergraduate universities remain teacher-centered, exam-oriented, and insufficiently responsive to learners' individual needs. Consequently, the adoption of AI in this field is viewed as a key catalyst for innovation, promoting personalized learning, intelligent feedback, and data-driven decision-making in pedagogy.

2. Literature Review

The application of Artificial Intelligence (AI) in language education has evolved rapidly over the past decade, leading to the emergence of new teaching paradigms underpinned by intelligent systems. Early research focused primarily on Computer-Assisted Language Learning (CALL)

and Intelligent Tutoring Systems (ITS), which aimed to individualize instruction and automate feedback[2]. More recent studies have extended these models through natural language processing, adaptive algorithms, and large language models such as ChatGPT, enabling more human-like, context-aware interaction[3].

AI-powered tools have been proven effective in supporting diverse aspects of language learning. For instance, automated writing evaluation systems such as Grammarly and Criterion enhance learners' writing proficiency by offering real-time feedback on grammar, coherence, and vocabulary[4]. Speech recognition technologies like ELSA Speak improve pronunciation and oral fluency through instant corrective feedback. Learning analytics and predictive modeling further allow teachers to track learners' progress, detect difficulties, and personalize instructional interventions. Collectively, these advancements have shifted language learning from a one-size-fits-all model to a data-informed, learner-centered approach. However, scholars also caution that AI's effectiveness depends heavily on pedagogical design rather than technology itself[5]. Without proper instructional scaffolding, AI may reinforce superficial learning or increase learners' dependency on technology. Thus, global research increasingly emphasizes human-AI collaboration, where teachers act as learning designers and AI serves as a cognitive partner that amplifies pedagogical possibilities rather than replaces educators.

3. Opportunities of AI-Enhanced English Teaching

The integration of Artificial Intelligence (AI) into vocational undergraduate English teaching has generated a wide spectrum of opportunities for enhancing teaching effectiveness, learner engagement, and professional competence development. Unlike traditional instructional models that rely heavily on uniform content delivery and teacher-centered pedagogy, AI enables a more adaptive, interactive, and data-driven learning ecosystem.

3.1 Personalized and Adaptive Learning

One of the most significant contributions of AI to language education lies in its ability to personalize learning experiences. Through machine learning algorithms and learner analytics, AI systems can analyze students' performance data—such as vocabulary acquisition, grammar

accuracy, and response time—to identify their strengths, weaknesses, and learning preferences. Based on these insights, AI can dynamically adjust learning paths, recommend tailored materials, and provide individualized scaffolding. For vocational undergraduate students, whose English proficiency levels and professional orientations vary widely, such personalization is particularly valuable. AI-driven platforms like Duolingo for Schools, AI Spoken English Tutor or iFlytek Smart Learning can deliver differentiated instruction that accommodates learners at distinct stages of language development. Moreover, adaptive systems can align English learning tasks with students' major-related contexts—for example, offering business correspondence exercises for management students or technical documentation tasks for engineering majors. This approach not only enhances learning efficiency but also strengthens the relevance between language learning and vocational practice.

Additionally, AI-powered personalization promotes learner autonomy[6]. By visualizing progress data and generating self-assessment feedback, students can monitor their own development and set realistic goals. This aligns with the competency-based orientation of vocational education, fostering self-regulated learning and lifelong learning awareness—key attributes for future professionals in an AI-driven workplace.

3.2 Intelligent Feedback and Assessment

Traditional methods of language assessment—such as paper-based tests or delayed teacher feedback—often fail to capture learners' real-time progress or provide immediate guidance. AI addresses this limitation through automated, formative, and data-supported evaluation mechanisms. Intelligent systems can analyze written or spoken language output instantly, diagnosing grammar errors, lexical appropriateness, pronunciation accuracy, and discourse coherence. Tools such as Grammarly, ELSA Speak have demonstrated how automated feedback can support continuous learning. For vocational undergraduates, AI assessment can also be integrated into ESP (English for Specific Purposes) contexts, evaluating learners' ability to complete job-related communicative tasks—such as writing business reports, delivering presentations, or participating in simulated interviews.

Furthermore, AI-enabled analytics allow teachers to track learners' engagement and performance longitudinally. Dashboards and performance visualization tools make it possible to identify struggling students early and design targeted interventions. This represents a shift from summative, test-centered evaluation to formative, process-oriented assessment, aligning with the current educational reform goals of "teaching–learning–assessment integration."

3.3 Immersive and Interactive Learning Environments

Another major opportunity provided by AI lies in the creation of immersive, interactive, and authentic learning environments. Combining AI with emerging technologies such as Virtual Reality (VR), Augmented Reality (AR), and conversational chatbots allows learners to practice English in real-world-like scenarios without geographical or temporal constraints. For example, AI-powered VR systems can simulate workplace communication settings such as hotels, airports, logistics centers, or business meetings. Learners interact with virtual agents, receive adaptive feedback, and repeat tasks until achieving communicative competence. Similarly, AI chatbots—such as Doubao or Deepseek—enable learners to engage in unlimited conversational practice, offering contextually appropriate responses and emotional engagement. These immersive experiences address the traditional shortcomings of vocational English classrooms, where exposure to authentic communication opportunities is limited. By situating language learning within simulated professional contexts, AI helps students develop contextual fluency, intercultural awareness, and workplace communication confidence. Moreover, interactive learning supported by AI fosters engagement and motivation, which are crucial for sustaining interest among students who often perceive English as a peripheral or exam-oriented subject.

3.4 Integration of Vocational Competence and Language Skills

A distinctive feature of vocational undergraduate English teaching is its emphasis on the integration of linguistic competence with professional skills. AI offers a unique opportunity to achieve this dual objective. Through intelligent content generation, simulation-based learning, and industry-linked data, AI can contextualize

language learning around authentic vocational tasks. For instance, AI systems can generate customized case studies, dialogues, or problem-solving activities aligned with students' disciplines. A logistics major might use AI-driven role-play simulations to manage shipment inquiries in English, while a tourism student might practice customer service interactions in a virtual hotel environment. Such contextualized learning reinforces the functional and communicative purpose of English, transforming it from an abstract academic subject into a practical tool for career development.

Additionally, AI supports the development of soft skills—such as teamwork, creativity, and problem-solving—by facilitating collaborative tasks through digital platforms. Intelligent group formation algorithms can match students with complementary skills, while analytics can assess communication dynamics and contribution levels within group projects. Consequently, AI not only enhances linguistic ability but also nurtures the employability and professional literacy that vocational education seeks to cultivate.

3.5 Data-Informed Teaching and Learning Management

Beyond direct learner engagement, AI empowers teachers and institutions through data-informed decision-making[7]. Learning analytics systems collect, interpret, and visualize data on learner behaviors, performance trends, and engagement levels. These insights enable teachers to adjust instructional design, identify patterns of misunderstanding, and predict at-risk students. In vocational colleges where classes are often large and heterogeneous, such analytics-driven teaching management greatly improves efficiency. Teachers can shift from reactive intervention to proactive support, optimizing time and resources. At the institutional level, aggregated learning data can inform curriculum development, resource allocation, and policy-making, advancing the construction of a smart vocational education ecosystem.

AI introduces a transformative paradigm for vocational undergraduate English teaching. It personalizes learning processes, enhances formative assessment, enables immersive and authentic practice, bridges linguistic and professional competencies, and supports data-driven educational management. Together, these opportunities contribute to the creation of a human–AI collaborative learning environment

that is more adaptive, equitable, and profession-oriented.

4. Challenges and Risks

While Artificial Intelligence (AI) has brought unprecedented innovation and flexibility to English teaching in vocational undergraduate education, its integration also poses multiple challenges. These challenges are not confined to technical issues but extend to pedagogical transformation, ethical governance, and human–AI role redefinition. Without addressing these dimensions, the benefits of AI-enhanced education may remain superficial or even counterproductive.

4.1 Technological and Infrastructural Barriers

The first challenge is the uneven technological foundation across vocational institutions. Despite growing investment in digital education, many colleges—especially those in less-developed regions—lack the infrastructure required for large-scale AI implementation. Inadequate internet bandwidth, limited access to intelligent learning platforms, and insufficient hardware resources constrain both teaching and learning efficiency. Moreover, the integration of AI systems often demands interoperability among multiple digital platforms, secure data storage, and regular software maintenance. Many institutions lack professional technical support teams capable of managing these systems effectively. Consequently, the potential of AI tools is frequently underutilized, resulting in fragmented and inconsistent adoption.

Another related issue is digital inequality among students. Not all learners possess equal access to smart devices or stable internet connections, leading to a “digital divide” that exacerbates educational inequity. For vocational undergraduates from economically disadvantaged backgrounds, such inequalities can further marginalize them in AI-enhanced learning environments. Addressing this infrastructural disparity is therefore essential to ensure inclusive and sustainable implementation of AI in English teaching.

4.2 Pedagogical and Ethical Concerns

AI technologies are reshaping traditional pedagogical models, yet this transformation raises several pedagogical and ethical dilemmas. From a pedagogical perspective, AI-based instruction tends to emphasize efficiency,

automation, and measurable outcomes, sometimes at the expense of creativity, critical thinking, and interpersonal communication—skills that are essential in both language learning and professional contexts[8]. If educators rely excessively on AI-generated content or automated feedback, learners may become passive consumers of machine-curated knowledge, diminishing their sense of agency and reflective capacity.

Ethically, the increasing use of AI introduces complex issues concerning data privacy, transparency, and algorithmic bias. AI systems collect vast amounts of learner data to generate personalized recommendations. However, the storage, analysis, and potential misuse of this data pose serious privacy risks. Furthermore, algorithmic decision-making may inadvertently reproduce biases embedded in the training datasets, resulting in unfair evaluation outcomes or discriminatory content.

Scholars such as Williamson and Eynon (2020) warn that without ethical oversight, AI may amplify systemic inequities rather than alleviate them. For vocational education, where inclusivity and social mobility are central goals, such ethical lapses could undermine the very purpose of educational equity. Therefore, a robust ethical framework—including informed consent, data protection, and algorithmic transparency—is indispensable for responsible AI adoption.

4.3 Teacher Roles and Professional Identity Transformation

The introduction of AI has also triggered a profound redefinition of teachers’ professional roles and identities. Traditionally, English teachers have served as the primary source of knowledge, feedback, and evaluation. However, as AI systems take over repetitive or technical tasks—such as grammar correction, vocabulary drills, and pronunciation assessment—the teacher’s role must evolve from knowledge transmitter to learning facilitator, designer, and AI collaborator. This transformation requires teachers to possess not only pedagogical expertise but also AI literacy—an understanding of how AI systems function, their affordances and limitations, and their implications for learning design. Unfortunately, many vocational English teachers have limited exposure to AI-related training, leading to resistance, anxiety, or superficial adoption. The lack of systematic professional development programs exacerbates

this problem, as teachers struggle to integrate AI meaningfully into curriculum design.

Moreover, the rapid automation of instructional tasks may threaten teachers' professional confidence and sense of value. Some educators fear that AI could replace their instructional role, leading to "technological displacement." It is therefore critical to reposition AI not as a substitute but as a pedagogical partner—a tool that amplifies human intelligence and creativity. Continuous teacher empowerment and collaborative professional learning communities are necessary to ensure that educators remain central agents in AI-driven teaching reform.

4.4 Curriculum and Evaluation Misalignment

A further challenge lies in the misalignment between existing curricula, teaching objectives, and evaluation systems. Most vocational English curricula are still structured around static textbooks, standardized exams, and traditional skill-based outcomes. These frameworks often fail to reflect the dynamic, data-driven, and process-oriented nature of AI-enhanced learning. For example, while AI tools enable personalized and formative assessment, institutional evaluation systems still prioritize summative tests that measure memorization rather than communication competence. Similarly, curriculum design rarely incorporates AI-supported learning tasks or cross-disciplinary collaboration, limiting the potential for authentic professional language use. This mismatch creates tension between innovation and institutional rigidity.

To fully realize AI's potential, curriculum reform must address the integration of AI-supported pedagogy with institutional assessment standards and accreditation requirements. Otherwise, teachers may find themselves caught between innovative intentions and bureaucratic constraints, leading to superficial adoption or "symbolic use" of AI technologies.

4.5 Psychological and Social Risks

Beyond the technical and pedagogical domains, AI also introduces psychological and social risks. Continuous exposure to automated systems may reduce learners' motivation, creativity, and interpersonal engagement. Some students develop overreliance on AI-generated feedback, expecting the system to "think" or "write" for them. This dependence not only undermines critical thinking but also raises concerns about

academic integrity, particularly in writing tasks assisted by generative AI. Furthermore, AI-mediated interaction lacks the emotional depth and empathy characteristic of human communication. In language learning—where affective factors such as anxiety, confidence, and motivation play critical roles—this absence of emotional resonance can negatively impact learning outcomes. Consequently, educators must strike a balance between technological assistance and human connection, ensuring that AI enhances rather than replaces the social dimension of education.

Addressing these challenges requires a holistic approach that combines technological infrastructure development, teacher professional training, ethical regulation, and curriculum innovation. Only by establishing a coherent framework that aligns technology with pedagogy and values can AI truly enhance the quality and equity of vocational English education.

5. Pedagogical Strategies and Implementation Pathways

While the integration of AI into English teaching offers immense potential, its successful implementation in vocational undergraduate English teaching depends on pedagogical innovation and institutional readiness. To achieve a balanced, ethical, and effective AI-enhanced learning ecosystem, teachers, learners, and administrators must collaboratively rethink curriculum design, teaching methodology, and assessment systems.

5.1 Human-AI Collaborative Teaching Model

A sustainable and effective integration of AI in vocational undergraduate English teaching relies on fostering human-AI collaboration rather than merely replacing teachers with technology[9]. Teachers remain the central facilitators of learning, responsible for designing meaningful, contextually relevant tasks, interpreting AI-generated feedback, and cultivating students' critical thinking, communicative competence, and professional literacy. AI tools—such as intelligent writing assistants, adaptive vocabulary trainers, pronunciation and speech recognition systems, and interactive simulation platforms—serve as supportive partners, providing real-time insights into learners' performance and automating routine instructional tasks, as shown in Figure 1.

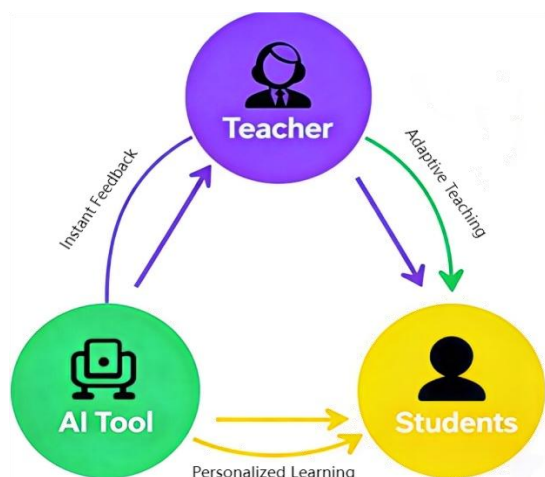


Figure 1. Human-AI Collaborative Model

This collaborative approach allows teachers to devote more time to higher-order pedagogical activities, including guiding reflective learning, promoting intercultural awareness, mentoring students in professional discourse, and designing scenario-based, task-oriented activities aligned with ESP (English for Specific Purposes) goals. Simultaneously, AI functions as a responsive “co-teacher,” offering personalized learning paths, multimodal practice environments, instant formative feedback, and adaptive scaffolding tailored to individual learners.

By leveraging the strengths of both humans and AI, the Human-AI collaborative model emphasizes a synergistic relationship: teachers ensure educational vision, ethical guidance, and contextual relevance, while AI provides data-driven insights, individualized practice, and continuous monitoring. This integration supports a dynamic, learner-centered ecosystem that enhances both linguistic competence and digital literacy skills, reflecting the goals of “smart vocational education” and the broader trend of teaching–learning–assessment integration.

5.2 Competence-Oriented Curriculum Redesign

AI-enhanced English teaching should prioritize the cultivation of vocational competence over mere linguistic accuracy, aligning curriculum design closely with the practical demands of students’ future careers. Rather than focusing solely on grammar or vocabulary acquisition, a competence-oriented approach emphasizes the ability to effectively perform language tasks within authentic professional contexts. Curriculum redesign should therefore integrate AI-powered tools and resources into task-based, real-world scenarios, creating immersive learning

experiences that mirror workplace communication challenges.

For instance, simulations of professional interactions—such as drafting bilingual reports, conducting virtual meetings, or managing cross-border customer service—can be embedded into the curriculum through AI-driven platforms. Adaptive learning technologies further enhance this approach by tailoring task difficulty, content, and feedback to each learner’s proficiency level and vocational interest. A logistics major, for example, may engage in AI-facilitated negotiation exercises for shipment contracts, while a tourism major might conduct virtual guided tours using English in simulated cultural environments. Similarly, AI-enabled writing assistants can provide instant feedback on business emails or project proposals, allowing learners to interactively refine both language and professional style.

This competence-based integration not only bridges the gap between classroom learning and workplace application but also fosters critical transferable skills, including problem-solving, intercultural communication, and professional adaptability. By embedding AI tools into authentic vocational scenarios, learners gain experiential knowledge, increase their communicative confidence, and enhance their employability in globalized professional environments. Ultimately, such curriculum redesign transforms English education from a purely linguistic exercise into a strategically aligned vocational training experience that prepares students for the multifaceted challenges of their chosen fields.

5.3 Data-Informed Assessment and Feedback

AI technologies offer unprecedented opportunities to enhance both formative and summative assessment in English teaching. Through real-time analysis, automated writing evaluation, and speech recognition scoring, AI systems can provide immediate, detailed feedback on students’ language use, including grammar, vocabulary, sentence structure, and pronunciation. Such tools allow educators to monitor learners’ progress continuously, identify specific areas of difficulty, and adjust instruction in a timely manner, thereby creating a more responsive and personalized learning environment. Yet, the integration of AI in assessment must be guided by rigorous pedagogical principles to ensure validity,

transparency, and fairness. Assessment design should carefully consider the alignment between AI-generated metrics and the intended learning outcomes, avoiding over-reliance on algorithmic scores as definitive judgments of student competence. AI-generated data should be used primarily as diagnostic information, helping teachers make informed instructional decisions and supporting learners' self-reflection.

A blended approach that combines automated feedback with human evaluation can provide a more holistic understanding of students' progress. For example, while AI may efficiently detect grammatical errors, syntactic patterns, or pronunciation accuracy, teachers remain essential for evaluating higher-order skills such as content organization, creativity, rhetorical effectiveness, and pragmatic appropriateness in real-world communication tasks. This dual-feedback mechanism not only preserves educational integrity but also enhances assessment efficiency, allowing teachers to focus on nuanced aspects of learning that AI alone cannot judge [10].

6. The Empirical Study

To investigate the effectiveness of AI-enhanced English teaching in vocational undergraduate education, focusing on linguistic competence, digital literacy, and vocational task performance. The study aims to evaluate both learning outcomes and the feasibility of human-AI collaborative teaching models.

6.1 Participants

200 vocational undergraduate freshmen were recruited from three major fields—Engineering, Business, and Modern Services—ensuring representation across disciplines. Prior to the study, students' English proficiency levels were assessed and categorized into basic, intermediate, and good or above. These students were divided

into two groups: an experimental group of 100 students receiving AI-enhanced instruction, and a control group of 100 students following traditional teacher-centered instruction. The intervention would span 12 weeks, corresponding to one academic semester, and would utilize a range of AI tools to support English learning. These tools include AI writing assistants such as Grammarly, AI speaking tutor, pronunciation platforms like ELSA Speak, VR/AR or chatbots for English for Specific Purposes (ESP) tasks, and learning analytics dashboards to monitor student progress. Students in experiment group would engage in task-based assignments, including business emails, technical reports, and simulated customer interactions, complemented by interactive AI practice sessions focused on speech, listening comprehension, and dialogue simulations. Additionally, AI-generated feedback will be used to create personalized learning paths tailored to each student's proficiency level and vocational context. The intervention would be guided by four vocational English instructors who have received training in both AI tools and pedagogical strategies, ensuring effective integration of technology into the teaching process.

6.2 Data Collection and Analysis

To measure the effectiveness of the AI-enhanced English teaching intervention, quantitative data were collected through pre-tests and post-tests administered at the beginning and end of the 12-week semester. The assessment covered four dimensions of English competence—listening, speaking, writing, and translation—each rated on a 100-point scale, as shown in Table 1. Both the experimental and control groups completed identical assessment tasks to ensure consistency and comparability.

Table 1. Sample Demographic Information

Dimension	Category	Total (N=200)	Experimental Group (n=100)	Control Group (n=100)
Major Category	Engineering (Intelligent Manufacturing)	112	56	56
	Business (Management)	68	34	34
	Modern Services (Aviation Services)	20	10	10
English Proficiency Level	Basic (Below Level 3)	76	38	38
	Intermediate (Level 3 - 4)	98	49	49
	Good and Above (Level 4 and Above)	26	13	13

6.3 Data Analysis

Quantitative data were analyzed using SPSS 26.0

to determine the impact of AI-enhanced English instruction on students' linguistic competence across the four skill areas: listening, speaking,

writing, and translation. Descriptive statistics (means and standard deviations) were first calculated to summarize the pre-test and post-test performance of both the experimental and control groups.

To examine within-group improvements, paired-sample t-tests were conducted to compare pre-test and post-test scores for each group. Additionally, independent-sample t-tests were used to assess the statistical significance of differences in learning gains between the two groups. The level of significance was set at $p < .05$. Effect sizes (Cohen's d) were calculated to indicate the magnitude of instructional impact.

6.4 Listening Performance

Both groups showed significant improvement after the 12-week intervention. The experimental group's mean score increased from 63.5 to 78.9 ($t = 9.12$, $p < .001$), indicating a large effect size ($d = 1.05$). In contrast, the control group improved from 62.8 to 70.2 ($t = 5.06$, $p < .01$, $d = 0.65$). The between-group comparison revealed a statistically significant difference in post-test scores ($t = 6.84$, $p < .001$), confirming that AI-enhanced learning produced superior listening gains, likely due to the adaptive and immediate feedback mechanisms provided by AI-based listening tools.

6.5 Speaking Performance

The experimental group demonstrated remarkable progress in speaking proficiency, with scores rising from 60.2 to 77.3 ($t = 10.54$, $p < .001$, $d = 1.20$). Students benefited from AI pronunciation correction and interactive oral simulations in virtual scenarios. The control group's improvement (59.7 $\rightarrow$ 68.1) was modest ($t = 6.03$, $p < .01$, $d = 0.70$). Post-test comparison

indicated a significant difference in oral performance between the two groups ($t = 7.32$, $p < .001$).

6.6 Writing Performance

In writing, the experimental group showed a substantial gain (65.8 $\rightarrow$ 80.6, $t = 8.62$, $p < .001$, $d = 0.98$), outperforming the control group (66.1 $\rightarrow$ 72.5, $t = 4.82$, $p < .01$, $d = 0.58$). The improvement can be attributed to AI writing assistants such as Grammarly, which provided continuous automated feedback and grammar correction. The independent t-test confirmed a statistically significant difference in writing gains ($t = 6.27$, $p < .001$).

Translation Performance

The translation results followed a similar trend. The experimental group's mean increased from 61.7 to 76.8 ($t = 9.44$, $p < .001$, $d = 1.10$), while the control group improved from 62.4 to 69.3 ($t = 5.01$, $p < .01$, $d = 0.63$). The higher post-test performance of the experimental group ($t = 6.91$, $p < .001$) suggests that AI-supported contextual and vocabulary learning enhanced students' translation accuracy and fluency.

Summary of Findings

Overall, the statistical results demonstrated that the AI-enhanced English instruction significantly improved students' performance across all four dimensions. The effect sizes ranged from 0.95 to 1.20, indicating a strong impact of AI-assisted pedagogy. The findings validate the feasibility of a human-AI collaborative teaching model, in which AI technologies provide individualized feedback and adaptive learning support, while teachers remain central in guiding interpretation, interaction, and communicative practice. The results are shown in Table 2.

Table 2. Comparison of Pre- and Post-Test Scores between Experimental and Control Groups across Four English Skill Areas

Skill Area	Group	Pre-Test Mean (SD)	Post-Test Mean (SD)	Mean Gain	t -value	p -value
Listening	Experimental (n=100)	63.5 (7.8)	78.9 (6.4)	+15.4	9.12	< .001
	Control (n=100)	62.8 (8.1)	70.2 (7.2)	+7.4	5.06	< .01
Speaking	Experimental	60.2 (8.6)	77.3 (7.1)	+17.1	10.54	< .001
	Control	59.7 (9.2)	68.1 (8.3)	+8.4	6.03	< .01
Writing	Experimental	65.8 (7.5)	80.6 (6.2)	+14.8	8.62	< .001
	Control	66.1 (7.2)	72.5 (6.8)	+6.4	4.82	< .01
Translation	Experimental	61.7 (8.0)	76.8 (6.5)	+15.1	9.44	< .001
	Control	62.4 (8.3)	69.3 (7.5)	+6.9	5.01	< .01

7. Conclusion and Future Studies

The integration of Artificial Intelligence into

English teaching for vocational undergraduate education represents both a transformative opportunity and a complex pedagogical challenge.

As demonstrated throughout this paper, AI has the potential to revolutionize the way English is taught and learned—by enabling personalized instruction, real-time assessment, intelligent feedback, and immersive learning experiences. These affordances align well with the practical, skill-oriented, and competency-based nature of vocational education, offering pathways to cultivate not only linguistic proficiency but also professional communicative competence and digital literacy.

The adoption of AI technologies in this field is not a simple technological upgrade but a systemic educational reform that requires careful planning and critical reflection.

Challenges related to teachers' AI literacy, infrastructure readiness, data ethics, and the preservation of humanistic educational values remain pressing. The overreliance on intelligent systems risks diminishing learners' creativity, critical thinking, and autonomy if not guided by sound pedagogy. Thus, the essence of AI-enhanced teaching should lie in the synergy between human expertise and machine intelligence, where AI supports, rather than substitutes, teachers' professional judgment and emotional engagement.

Looking toward the future, several research directions merit further exploration. First, more empirical studies are needed to evaluate the long-term learning outcomes of AI-enhanced English instruction in diverse vocational disciplines. Comparative research could examine how AI-mediated approaches affect learner motivation, performance, and employability across different cultural and institutional contexts. Second, teacher cognition and attitudes toward AI should be systematically investigated to identify barriers to adoption and to design effective training models that enhance educators' digital competence. Third, ethical frameworks for AI in education require refinement, particularly regarding data security, algorithmic transparency, and fairness in automated evaluation systems. Finally, interdisciplinary collaboration among linguists, educators, technologists, and policymakers will be crucial to shaping an inclusive, equitable, and human-centered future for AI-driven language education.

AI-enhanced English teaching in vocational undergraduate education holds great promise for transforming traditional pedagogies and fostering a more intelligent, personalized, and professional learning environment. Yet this transformation

must proceed with prudence and purpose. The ultimate goal is not to replace the teacher or mechanize learning, but to construct a smart, ethical, and learner-centered ecosystem where AI amplifies human creativity, supports vocational identity formation, and equips students with the communicative competence and adaptability demanded by the digital era. By embracing both technological innovation and educational humanism, vocational English education can truly evolve into a future-ready model of teaching and learning.

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