A Study on Generative AI Empowering Vocational Undergraduate English Writing Instruction

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Abstract: *With the rapid development of generative Artificial Intelligence (AI) technology, its application potential in the field of education is becoming increasingly prominent. Vocational undergraduate English writing instruction, which emphasizes practicality and vocational orientation, encounters limitations in traditional teaching models in terms of personalized feedback, learning efficiency, and the construction of vocational contexts. Based on constructivist learning theory, sociocultural theory, and mastery learning theory, this study constructs a theoretical framework for the integration of generative AI into English writing instruction, systematically elaborating on its intrinsic mechanisms and structural dimensions. Building upon this foundation, the study proposes an empowerment model with intelligent agents, data flow, and contextual design as its core components. It develops a three-layer teaching structure consisting of foundational support, core activities, and top-level guidance. Additionally, it outlines a three-phase iterative implementation process covering preparation, intervention, and integration, accompanied by a multidimensional comprehensive efficacy evaluation system. The study further analyzes practical challenges such as technical reliability, instructional adaptability, and academic integrity, proposing optimization strategies from technical, instructional, managerial, and support levels. Finally, it suggests sustainable development directions focusing on educational technology ecosystem construction, integration of research and practice, and future-oriented literacy cultivation, aiming to provide theoretical references and practical pathways for the innovation and reform of English writing instruction in vocational undergraduate education.*

Keywords: *Generative AI; Vocational Undergraduate Education; English Writing Instruction; Human-Machine Collaboration; Empowerment Model*

1. Introduction

Vocational undergraduate education aims to cultivate high-quality technical and skilled talents. The effectiveness of English writing instruction, which serves as a core competency for cross-cultural professional communication, directly impacts students' potential for career development. However, traditional English writing instruction faces challenges such as delayed feedback, limited practice opportunities, and insufficient personalized guidance, making it difficult to fully meet students' learning needs in terms of linguistic accuracy, logical rigor, and adaptability to professional contexts. The emergence of generative Artificial Intelligence (AI) technology provides new possibilities for restructuring the English writing instruction model. Its powerful capabilities in natural language generation and interaction can provide students with immediate, diverse, and contextualized writing support. Against this backdrop, exploring how generative AI can empower English writing instruction in vocational undergraduate education not only holds practical significance for promoting the digital transformation of teaching methods but also represents an essential requirement for deepening the integration of industry and education and enhancing talent's professional adaptability. By constructing a framework that integrates theory and practical models, this study systematically analyzes its intrinsic mechanisms and practical pathways, aiming to provide systematic solutions for the reform of writing instruction empowered by technology.

2. Theoretical Framework for the Integration of Generative AI and English Writing Instruction

2.1 Theoretical Foundations of Generative AI in Education

The integration of generative AI into education is grounded in profound educational theories.

According to constructivist learning theory, which posits that knowledge is not passively received but actively constructed by learners through interaction with their environment, generative AI serves as a cognitive partner in this process. It can instantly generate diverse textual resources and offer multi-faceted writing insights, thereby creating rich meaning-making contexts for learners and prompting them to deepen their understanding of English writing through dialogue with the intelligent agent.

Simultaneously, sociocultural theory emphasizes the role of social interaction and mediating tools in promoting cognitive development. As an advanced intelligent mediating tool, generative AI externalizes the internal, complex processes of writing thinking. By providing scaffolded language support and content feedback, it assists learners in bridging the "zone of proximal development" they face when writing independently, thereby enhancing their writing capability.

Furthermore, mastery learning theory suggests that the time required for different learners to achieve a specific mastery level varies. The personalized feedback and generative capabilities of generative AI make it possible to provide customized writing practice paths and immediate tutoring for each vocational undergraduate student, offering a technological pathway for realizing differentiated instruction and mastery learning[1].

2.2 The Intrinsic Mechanism of Integration with English Writing Instruction

The core of how generative AI empowers English writing instruction lies in the deep coupling and mechanism innovation of key teaching processes. Its intrinsic mechanism is primarily manifested in three dimensions: the reconstruction of the writing process, the innovation of the feedback paradigm, and the expansion of language input.

At the level of the writing process, the traditional approach of outlining, drafting, and revising gives way to an iterative, interactive model of human-machine collaboration. Learners may instruct AI to generate initial outlines, elaborate paragraphs, or experiment with stylistic choices, thereby engaging in direct training of their metacognitive writing abilities.

In terms of feedback, generative AI overcomes the constraints of traditional methods regarding timeliness and granularity. It delivers multidimensional formative assessments that encompass vocabulary, grammar, discourse structure, content logic, and stylistic expression, thereby creating a tireless one-on-one writing coaching environment.

Regarding language input, generative AI can generate substantial amounts of high-quality, contextualized target language materials tailored to learners' interests and proficiency. This practice significantly enriches comprehensible input and establishes a solid foundation for effective language output.

2.3 Construction Principles and Dimensions of the Theoretical Framework

The construction of a theoretical framework for integrating generative AI with vocational undergraduate English writing instruction must adhere to three core principles: learner-centeredness, the unification of pedagogical primacy and technological empowerment, and ethical controllability. The learner-centeredness principle ensures that all technological applications ultimately serve the development of students' writing competence and critical thinking, rather than functioning as mere demonstrations of technical prowess. The pedagogical primacy principle emphasizes that generative AI is a tool to assist instruction, and its application strategies and depth should be guided by teaching objectives. The ethical controllability principle requires that the framework design fully considers the transparency, fairness, and data privacy of technological applications, while guarding against students' over-reliance on the technology.

Based on the aforementioned principles, this theoretical framework can be deconstructed into three key dimensions: the objective dimension, the process dimension, and the evaluation dimension. The objective dimension defines the specific roles of generative AI in enhancing writing fluency, accuracy, complexity, and cross-cultural communication skills. The process dimension details the interaction models and teaching strategies for human-machine collaboration throughout the entire writing process, including pre-writing, while-writing, and post-writing stages. The evaluation dimension constructs a diversified and multi-dimensional assessment system that integrates machine evaluation, teacher evaluation, and peer evaluation. This ensures the alignment of teaching and assessment, enabling precise diagnosis and continuous optimization of the learning process[2].

3. Construction of the Generative AI-Empowered English Writing Instruction Model

3.1 Analysis of the Core Elements of the Empowerment Model

3.1.1 The Intelligent Agent as a Cognitive Partner

Within the empowerment model, generative AI transcends the role of a traditional auxiliary tool, evolving into a cognitive partner with collaborative capabilities. It moves beyond providing superficial services such as spell checking and grammar correction. Instead, by leveraging its profound capabilities in language understanding and generation, it engages at the metacognitive dimension of writing. The intelligent agent can respond to student directives to conduct brainstorming, generate argumentative frameworks, provide diverse expressions with similar semantics, and even simulate specific genres for academic composition. This interaction drives a shift in learners' roles from passive text producers to active text designers and coordinators. Through ongoing dialogue with the agent, students continually refine their thinking and validate their ideas, thereby deepening their grasp of writing strategies and language application.

3.1.2 The Closed-Loop Feedback Mechanism of Instructional Data Flow

The instructional data flow serves as the core driver for enabling the model's adaptability and precision. This element encompasses the entire process data, ranging from students' initial prompts and multiple rounds of AI-generated text to their revision choices and the final product. These data constitute a dynamic, analyzable closed-loop system. By analyzing interaction logs, the system can identify recurring difficulties in student writing, such as specific logical coherence issues or limitations in vocabulary usage. Based on these insights, the instruction model can achieve dynamic adjustments, for instance, by automatically pushing targeted micro-lecture resources or presetting relevant exercises in subsequent tasks. This establishes a precise teaching cycle from data collection to personalized intervention, providing writing scaffolding tailored to the current competency level of each vocational undergraduate student[3].

3.1.3 The Authenticity and Integration of Instructional Context Design

The design of the instructional context determines the strength of the connection between technology empowerment and learning objectives. This element is particularly crucial for vocational undergraduate education. It requires anchoring writing tasks within highly simulated professional scenarios, such as writing project proposals, simulating customer emails, and analyzing technical reports. Generative AI can generate authentic language materials with specific industry terminology that align with professional contexts based on these specific scenarios. This design ensures that writing practice is no longer an isolated language exercise but rather comprehensive skills training deeply integrated with students' professional fields and future vocational identities. In the process of completing such tasks, students not only hone their language skills but also subtly acquire the norms and logic of workplace communication.

3.2 Structural Design of the Instruction Model

3.2.1 Technical Integration and Resource Adaptation in the Foundational Support Layer

The foundational support layer serves as the operating environment for the entire model, emphasizing the seamless integration of the technological platform with the course content. This layer involves embedding application programming interfaces of generative AI into the existing learning management system and, in line with the English writing syllabus for vocational undergraduates, constructing a corresponding prompt template library, model essay repository, and evaluation criteria database. Resource adaptation focuses on screening and developing corpora and writing task banks that align with different professional orientations. This ensures that the content generated by the AI meets the learning needs of students from specific majors in terms of theme, vocabulary, and genre, thereby providing a stable and reliable resource foundation for the implementation of instructional activities in the upper layers.

3.2.2 The Human-Machine Collaborative Closed-Loop Process in the Core Activity Layer

The core activity layer depicts the dynamic process of instruction implementation, forming a collaborative closed loop of preparation, interaction, and reflection. In the preparation stage, teachers take the lead in designing tasks and clearly defining the intervention points and approaches for AI in each segment. During the interaction stage, students engage in deep collaboration with the intelligent

agent, cyclically performing idea stimulation, content expansion, language refinement, and structural optimization. This process emphasizes students' primary decision-making role, namely the critical selection, integration, and revision of content generated by the intelligent agent.. In the reflection stage, students are required to conduct a metacognitive analysis of their human-machine collaboration process and explain the rationale behind their choices and modifications. This enables the internalization of external technical support into their own writing strategies and critical thinking skills.

3.2.3 Teacher Metacognitive Monitoring in the Top-Level Guidance Layer

The top-level guidance layer establishes the teacher's central leading role within the entire human-machine collaborative system. The teacher's role transforms into that of a metacognitive monitor and a stimulator of higher-order thinking within the instructional process. Their responsibilities include planning the overall instructional sequence, designing writing tasks that foster deep thinking, monitoring potential cognitive laziness or biases among students during their interaction with AI, and providing timely human-exclusive emotional support, value judgments, and creative inspiration. Through approaches such as organizing seminars, guiding students to compare different solutions, and conducting final quality assurance, the teacher ensures that technological empowerment ultimately contributes to the improvement of students' cognitive structures and the enhancement of their comprehensive competencies.

3.3 Implementation Process and Efficacy Evaluation

3.3.1 Three-Phase Iterative Implementation Process

The implementation of the model is a gradual, iterative process. The preparation phase focuses on foundational development, including the selection and testing of technological tools, and AI literacy training for both teachers and students, with particular emphasis on cultivating skills in prompt design and information criticism. The intervention phase constitutes the core operational period of the model. During this phase, students, in accordance with the structured design and under teachers' supervision, apply generative AI to authentic writing projects. They fully experience several complete cycles of human-machine collaborative writing, from topic selection and project initiation to final product delivery, while documenting their collaborative processes and decision-making logic. The integration phase emphasizes the internalization of learning outcomes. Through activities such as organizing project outcome presentations and writing reflective reports on the collaborative process, students are guided to systematically consolidate their learning gains and transfer the writing and technology application skills developed under the new model to new and complex task scenarios[4].

3.3.2 Multidimensional Comprehensive Efficacy Evaluation System

The evaluation of the model's efficacy must employ multidimensional indicators to comprehensively capture its pedagogical value. The evaluation system should encompass three core dimensions. The first is the outcome dimension, which refers to the quality of the final text in terms of linguistic accuracy, content richness, logical rigor, and stylistic appropriateness. The second is the process dimension, which focuses on the quality of the student's interaction with the AI, such as the precision of prompts, the ability to critically select and integrate generated content, and the metacognitive strategies demonstrated during collaboration. The third is the development dimension, which assesses students' long-term growth in writing self-confidence, autonomous learning ability, and critical thinking habits through methods like pre-test and post-test comparisons and learning portfolio analysis. This comprehensive evaluation system not only measures students' writing proficiency but also evaluates the effectiveness of the instruction model in cultivating students' core competencies for the intelligent era, providing a scientific basis for the continuous optimization of the model.

4. Practical Challenges and Path Optimization in the Application of Generative AI

4.1 Major Obstacles in Practical Application

The promotion and application of generative AI in vocational undergraduate English writing instruction faces multiple practical challenges, which hinder the full realization of its potential. The technical reliability and content credibility of these models pose a primary challenge, as they can produce hallucinated outputs containing factual inaccuracies, internal contradictions, or cultural biases. This requires users to possess high levels of information discernment and critical thinking skills, placing a cognitive load on both teachers and students.

Instructional adaptability and integration depth represent another core difficulty. Existing general-purpose models are not specifically designed for instructional scenarios, leading to uncertainties regarding whether their generated content aligns appropriately with language difficulty, stylistic conventions, and vocational contexts. Translating technological capabilities into effective pedagogical interventions accurately requires substantial localized adaptation and instructional design innovation.

The boundaries between academic integrity and assessment validity urgently require clarification. Defining the ownership of texts generated through human-machine collaboration is challenging, and the traditional outcome-oriented writing evaluation system is facing challenges, necessitating the establishment of new assessment paradigms capable of measuring both process engagement and final outcomes.

Resource accessibility and operational thresholds are also significant considerations. Factors such as technology access costs, disparities in digital infrastructure, and varying levels of digital literacy among teachers and students may exacerbate educational inequality and create new application barriers.

4.2 Strategic Framework for Path Optimization

Addressing the aforementioned challenges requires the construction of a multidimensional and systematic strategic framework for path optimization.

Therefore, at the technical level, a key direction is to promote the development of education-specific models and toolkits. This involves training specialized models capable of understanding instructional intent and adhering to instructional principles by equipping them with instructional knowledge and high-quality educational data, while integrating content filtering and bias detection mechanisms to enhance output reliability.

At the management level, establishing sound usage standards and ethical guidelines is essential. This entails clearly defining the boundaries of AI assistance for different writing tasks, formulating rules regarding content authorization and output attribution, and shifting the focus of academic integrity education from merely preventing plagiarism to the responsible use of technology.

At the instructional level, innovations in instructional design are central. The focus should be on developing scenario-based prompt engineering guides, templates for human-machine collaborative writing tasks, and management protocols for process-oriented learning portfolios, thereby guiding teachers and students to transition from being tool operators to strategic collaborative partners.

At the support level, implementing sustained professional development programs and building communities of practice are crucial supports. These initiatives, conducted through workshops, case discussions, and peer exchanges, are designed to systematically enhance teachers' skills in technological integration and the management of human-machine collaborative instruction models[5].

4.3 Sustainable Development and Forward-Looking Planning

Ensuring the long-term viability of generative AI in empowering instruction requires a focus on sustainable development and strategic foresight. Constructing a dynamic and evolving educational technology ecosystem forms the foundation. This implies that instructional platforms, AI tools, and evaluation systems should possess robust interoperability, enabling smooth iteration alongside technological progress, while simultaneously encouraging technical refinements based on pedagogical feedback to foster a mutually reinforcing symbiotic relationship. Promoting the deep integration of research and practice serves as the driving force. Future research should go beyond mere effectiveness comparisons and shift towards exploring optimal interaction modes for human-machine collaboration, the differential impacts on students with varying ability levels, and how long-term application shapes students' cognitive development and writing identity, thereby providing a solid theoretical basis for practice[6].

Cultivating future-oriented literacy goals is the ultimate objective. The core purpose of instruction practice is not only to improve immediate writing performance but also to develop students' AI literacy. This enables them, even after leaving the academic environment, to confidently, critically, and creatively leverage various intelligent tools to address complex workplace challenges, thereby achieving the long-term continuation of educational value. Prospectively establishing an adaptive

governance framework is also crucial. This framework must be capable of flexibly responding to new issues arising from rapid technological iteration, maintaining a balance between encouraging innovation and managing risks.

5. Conclusion

This study, through the construction of a theoretical framework and practical model for generative AI-empowered English writing instruction in vocational undergraduate education, systematically demonstrates its educational value in reconstructing the writing process, enhancing feedback mechanisms, and expanding language input. The research indicates that intelligent agents centered on the cognitive partner role, closed-loop instructional data flow, and authentic context design collectively form the foundation of human-machine collaborative instruction. The three-layer structured model and the three-phase implementation process provide clear pathways for teaching practice. The multi-dimensional evaluation system enables a comprehensive assessment ranging from writing outcomes to cognitive development. Looking ahead, the continuous evolution of technology and its deep integration with educational scenarios still require overcoming key issues such as model reliability, instructional adaptability, and ethical norms.

Subsequent research should focus on the development of large-scale educational models, in-depth exploration of human-machine collaborative cognitive mechanisms, the cultivation of interdisciplinary writing abilities, and the establishment of long-term teacher development systems. This will drive the evolution of generative AI from instrumental assistance toward ecological empowerment, ultimately injecting sustained momentum into the high-quality development of vocational undergraduate education.

References

[1] Luo Yuanmei. "The Application of Generative AI Language Models in College English Writing Instruction." Journal of Taiyuan Urban Vocational College. 10(2025):88-90.
[2] Chu Jinjin. "The Study on College Students' Attitudes Toward Generative Artificial Intelligence-Assisted Academic English Writing." China Educational Technology. 08(2025):123-130.
[3] Wang Haixiao. "Applying Generative Artificial Intelligence in College English Teaching Reform: A Case Study of the 'English Writing for General Academic Purposes' Course." Foreign Language Education in China. 04(2024):41-50+95.
[4] Qin Danxue. "Discussion on the College English Foreign Language Model in the Context of Big Data Technology: A Review of 'An E-learning Course in Writing'." Science and Technology Management Research. 15(2023):266.
[5] Liang Haiying. "College English Writing Teaching from the Perspective of Digital Humanities: Notions and Methods." Foreign Language World. 06(2022):50-57.
[6] Cao Jingjie. "Research on College English Writing Teaching Methods in the Digital Context: A Review of College English Writing Teaching and Research Based on a Digital Platform." Science and Technology Management Research. 13(2021):236.