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Research on the Intelligent Transformation Path of Japanese Writing Teaching from the Perspective of Human-Machine Collaboration

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Abstract

Against the background of digital transformation in education, generative artificial intelligence provides technical support for solving the long-standing dilemmas in traditional foreign language writing instruction. However, existing research mostly focuses on English teaching, and intelligent research on Japanese writing teaching remains largely blank. Adopting action research and case study methods, this study conducted a 16-week teaching practice with two parallel classes of Japanese majors in a university and systematically explored the application paths of generative AI in three core scenarios: basic writing, business practical writing, and academic writing. The findings reveal that generative AI can significantly improve teaching feedback efficiency and students' pragmatic competence, yet it faces special challenges in Japanese honorific generation, style adaptation, and cultural context understanding. Accordingly, this study constructs a human-machine collaborative teaching mode featuring "AI as technical support and teachers as humanistic leaders", clarifies the role division and whole-process application framework, and provides theoretical references and practical implications for the intelligent transformation of Japanese writing teaching.

Keywords

Generative Artificial Intelligence, Japanese Writing Teaching, Human-Machine Collaboration, Practical Teaching, Pragmatic Teaching

1. Introduction

The digital transformation of education has become the core strategy for the development of higher education in the new era. Technological breakthroughs in

generative artificial intelligence (AI) large language models are profoundly reshaping the ecological landscape of foreign language teaching. As a core component of language output competence, writing instruction is one of the areas in foreign language education most susceptible to the impact of intelligent technologies. In recent years, domestic academia has conducted extensive empirical studies on generative AI-empowered English writing teaching, confirming its significant value in improving teaching efficiency and meeting personalized learning needs. Empirical data from Li Yan (2025b) show that after the introduction of generative AI, the frequency of students' writing revisions increased by 152%, and the adoption rate of intelligent feedback reached 87%, effectively breaking the efficiency bottleneck of traditional teaching.

However, traditional Japanese writing teaching still faces intractable structural dilemmas. Teachers' heavy grading workload leads to severe feedback delays, making it difficult to provide detailed and targeted guidance on Japan's unique honorific system, stylistic differences, and pragmatic rules. The severe homogenization of teaching content fails to meet the personalized learning needs of students at different levels, resulting in generally high writing anxiety and insufficient learning engagement among students.

Existing research exhibits a significant imbalance in language coverage and has not specifically addressed the field of writing teaching. Integrative research on generative AI and Japanese writing teaching remains largely unexplored, and research conclusions from English teaching cannot be directly transferred to Japanese teaching scenarios with their unique linguistic characteristics. Against this backdrop, this study takes practical writing instruction for Japanese majors in universities as the research object, adopts the case study method and action research method, and systematically analyzes the application pathways and unique challenges of generative AI in core scenarios such as basic Japanese writing and business application writing through 16 weeks of teaching practice. It aims to construct a human-machine collaborative teaching model adapted to the characteristics of Japanese teaching, thereby providing theoretical references and practical insights for the intelligent transformation of Japanese writing teaching.

2. Current Research Status of Generative Artificial Intelligence and Foreign Language Writing Instruction

The technological iteration of generative artificial intelligence has provided crucial support for addressing the long-standing dilemmas in traditional foreign language writing teaching. In recent years, domestic academia has conducted systematic research on its application value, practical pathways, and potential risks, forming a relatively mature "value-model-challenge" analytical framework that has laid a solid foundation for the intelligent transformation of foreign language teaching.

In terms of application value and empirical effectiveness, existing studies have confirmed the empowering role of generative AI through multiple rounds of teaching practice. He Mengyuan (2026) adopted the action research method and

found that the deep integration of AI into genre-based writing instruction can enhance task authenticity and strengthen students' genre awareness, critical thinking, and audience awareness. Han Jiemin (2025) further verified, based on the Interaction Hypothesis, that AI can optimize language input-output interaction and meet personalized learning needs. The empirical data from Li Yan (2025b) in vocational college teaching is the most representative, showing that after the introduction of DeepSeek, students' writing duration increased by 35%, revision frequency rose by 152%, and the adoption rate of intelligent feedback reached 87%. In addition, scholars such as Wang Yushan (2025c), Wu Shilian (2024), and Li Chengcheng (2025a) pointed out that AI can accurately identify grammatical errors and realize batch real-time grading, effectively solving the bottlenecks of feedback delay and insufficient differentiated guidance. Early studies on ChatGPT by Li Lu (2024c), Rui Tingting and Wang Fang (2024), and Xue Chaoqian (2023) preliminarily verified its writing assistance value, while Wang Meng (2025a) expanded the application boundaries of digital technology in vocational college writing teaching.

Regarding teaching models and practical pathways, existing research has constructed an application system covering the entire teaching process. Bu Yating (2025) proposed a new teaching paradigm of "process-oriented, thinking-centered, and personalized learning" and designed an integrated pre-class, in-class, and after-class solution. Wang Nuping (2025b) clarified the human-machine collaborative feedback model of "AI technical feedback + teacher humanistic feedback". Luo Yuanmei (2025) integrated three types of models: writing assistance tools, intelligent platforms, and interactive teaching, while Cheng Yanyun (2024) refined the operational process of "pre-class material generation - in-class collaborative writing - after-class intelligent evaluation". Du Huifang (2024) combined AI with the Outcome-Based Education (OBE) concept and proposed outcome-oriented personalized strategies, and Wei Maona (2025) explored the integration path of AI and Project-Based Learning (PBL).

In terms of risks, challenges, and optimization strategies, the academic community has maintained a highly rational attitude. Zhao Yuexin (2025) systematically summarized three core limitations of AI: uniformity in writing outputs caused by stylized language logic, contextual adaptation bias, and superficial thinking cultivation. Han Jiemin (2025) and Bu Yating (2025) further pointed out deep-seated issues such as academic integrity, technological dependence, and insufficient teachers' digital literacy. Li Chengcheng (2025a) emphasized the need to maintain a balance between technological application and teaching practice to prevent students from losing their independent writing ability.

In summary, although existing research has achieved fruitful results, there are still obvious shortcomings. First, there is a severe imbalance in language coverage. Only Chen Yijing (2025) discussed the application of AI in Japanese blended teaching, and did not involve writing instruction. Integrative research on generative AI and Japanese writing remains largely unexplored. Second, there is a lack

of research on linguistic feature adaptation. The unique characteristics of Japanese, such as its honorific system and stylistic differences, impose higher requirements on AI, and research conclusions from English teaching cannot be directly transferred. Third, there is a scarcity of targeted practical cases and a lack of empirical data from teaching scenarios unique to Japanese writing, making it difficult to guide frontline teaching. Based on the above research gaps, this study focuses on the following questions: What are the specific application pathways of generative AI in core teaching scenarios such as basic Japanese writing and business application writing? How can replicable teaching cases be constructed? How can a human-machine collaborative teaching model adapted to the characteristics of Japanese teaching be built?

3. Research Methods

3.1. Research Participants

This study selected two parallel classes (15 students per class, 30 students in total) of 2024-grade Japanese majors from the School of Foreign Languages at Shaoxing University and Zhejiang Yuexiu University of Foreign Languages as research participants. All students were in their second semester, had completed Japanese N3 level courses, and had no prior experience using AI to assist Japanese writing. Class assignment was conducted using random cluster sampling. An independent samples t-test was performed on the pre-test scores of Japanese writing proficiency of the two classes using SPSS 26.0, and the results showed $t = 0.312$, $p = 0.757 > 0.05$, indicating no statistically significant difference in the initial writing proficiency between the two groups. Finally, Class 2 was designated as the experimental group and Class 1 as the control group.

3.2. Instructor and Intervention Schedule

The Japanese writing courses for both classes were taught by the same instructor, who has 3 years of teaching experience in Japanese writing and has received specialized training in the pedagogical application of generative AI. The instructor is proficient in operating the three research tools, effectively eliminating the interference of individual teacher differences on the research results. The teaching practice lasted for 16 weeks, with 2 class hours per week, totaling 32 class hours. It was implemented in three phases: basic writing phase (Weeks 1 - 6), business practical writing phase (Weeks 7 - 12), and academic writing foundation phase (Weeks 13 - 16). The experimental group introduced AI-assisted teaching, while the control group adopted the traditional teaching model of "teacher explanation - student writing - teacher grading".

3.3. Research Design: Integration of Action Research and Case Study

This study adopted a mixed-methods research design, with "action research as the main approach and case study as the auxiliary approach", integrating the spiral

improvement cycle of action research with the in-depth analysis of case study.

Three complete cycles of action research were conducted, corresponding to the three teaching scenarios, respectively. Each cycle included four core links: "plan-act-observe-reflect": 1) Planning link: Design the teaching plan and AI application strategy for this cycle based on the reflection results of the previous cycle and teaching objectives; 2) Action link: Implement standardized teaching interventions in the experimental group and fully record the teaching process; 3) Observation link: Collect data through classroom observation scales, assignment analysis systems, and student learning logs, with core observation points including student classroom participation rate, AI feedback adoption rate, error correction rate, and depth of writing revision; 4) Reflection link: Analyze the data of this cycle, summarize the teaching effectiveness and existing problems, and adjust the teaching plan for the next cycle. For example, after the first cycle of basic writing, it was found that some students overly relied on AI to directly generate sentence structures. Therefore, an "AI revision comparative analysis" link was added in the second cycle of business writing, requiring students to explain the reasons for each revision in writing.

For the case study, purposive sampling was used to select 3 students of different proficiency levels (1 high-achieving student, 1 average student, and 1 low-achieving student) from the experimental group as case study subjects. Their complete writing process over the 16 weeks was tracked, and the influence mechanism of AI on the development of the writing ability of students at different levels was explored through semi-structured interviews and assignment text analysis.

3.4. AI Tool Usage Specifications and Standardized Procedures

This study selected three mainstream large language models (LLMs): Kimi, Doubao, and DeepSeek, and adopted the usage strategy of "scenario-specific dedicated models + multi-model cross-validation": 1) Doubao was used in the basic writing scenario, as it has the highest accuracy in Japanese basic grammar error correction and simple sentence structure optimization (pre-experimental accuracy rate reached 92.3%); 2) Kimi was used in the business writing scenario, as it has strong long-text processing capability and a more accurate understanding of business contexts and communicative intentions; 3) DeepSeek was used in the academic writing scenario, as it has greater professionalism in academic terminology translation and paper structure generation.

To ensure the internal validity of the study, all AI prompts were uniformly designed by the research team and optimized through three rounds of pre-experiments to form a standardized prompt library. The teacher intervention process was fully standardized, including consistent classroom lecture duration, individual tutoring frequency, and assignment feedback forms for both classes. Students in the experimental group uniformly used exclusive AI accounts provided by the school and were prohibited from using other unauthorized tools. For the final drafts submitted by students, the three tools were used to cross-check basic errors,

and the teacher made the final judgment on controversial content.

3.5. Evaluation Indicators and Measurement Tools

This study adopted the following six core evaluation indicators, all of which were clearly defined at their first use:

Sentence variety score: Using the Japanese Writing Sentence Diversity Evaluation Scale, the proportions of simple sentences, compound sentences, and complex sentences in the composition were counted. The score was calculated as follows: 5 points for a simple sentence proportion <30%, 4 points for 30% - 50%, 3 points for 50% - 70%, 2 points for 70% - 90%, and 1 point for >90%. The scoring was independently completed by 2 Japanese language lecturers, with an inter-rater reliability coefficient $\alpha = 0.87$.

Honorific accuracy rate: The ratio of correct honorific usage to total honorific usage in the composition was counted. Error types included misuse of sonkeigo (respectful language), misuse of kenjōgo (humble language), inappropriate teineigo (polite language), and missing honorifics. The scoring was completed by two teachers with more than five years of teaching experience in business Japanese, with an inter-rater reliability coefficient $\alpha = 0.92$.

Format compliance rate: In accordance with the Japan Business Association Business Email Writing Standards (2023 Edition), the ratio of format elements (title, salutation, greeting, body, closing, signature, date) that meet the specifications to the total number of elements was calculated. The initial evaluation was completed by AI and then reviewed by the teacher.

Revision frequency: The number of effective revisions from the first draft to the final draft by students was counted, including AI-assisted revisions and teacher-guided revisions, which were automatically recorded by the Chaoxing Learning Management System (LMS).

Writing duration: The time from when students entered the writing interface to when they submitted the first draft, which was automatically timed by the Chaoxing Learning Management System (LMS).

Writing anxiety: Using the adapted Japanese version of the Second Language Writing Anxiety Inventory (SLWAI), which contains 22 items and uses a 5-point Likert scale. A higher score indicates a higher level of writing anxiety, with a scale reliability coefficient of $\alpha = 0.89$.

3.6. Data Collection Procedures

The data collection of this study was divided into three phases: 1) Pre-test phase (Week 0): Conducted a Japanese writing proficiency pre-test and a writing anxiety scale survey on both classes; 2) Process data collection phase (Weeks 1 - 15): Collected weekly assignment data, revision records, and writing duration through the teaching platform, and simultaneously conducted classroom observations and collected student learning logs; 3) Post-test and interview phase (Week 16): Conducted a Japanese writing proficiency post-test and a writing anxiety scale retest

on both classes, and conducted semi-structured interviews with the 3 case students in the experimental group and the instructor. All data were statistically analyzed using SPSS 26.0.

4. Typical Application Cases of Generative AI-Empowered Japanese Writing Instruction

This study selected two parallel classes (15 students each) of second-year Japanese majors in a university to conduct a 16-week teaching practice. The experimental group was introduced to three leading large language models (LLMs): Kimi, Doubao, and DeepSeek, while the control group adopted the traditional teaching model. In line with the core requirements of Japanese writing instruction, this study focused on exploring AI application pathways in three typical scenarios: basic narrative writing, business email writing, and academic abstract writing. The specific practical cases are presented below.

4.1. Basic Writing Scenario: AI-Assisted Sentence Structure Optimization and Narrative Logic Organization

Teaching Objectives: To master the fundamental structure of Japanese narratives, enhance sentence variety and narrative coherence, and address the prevalent issues of "stacking of simple sentences" and "logical gaps" among students.

This scenario adopts a three-stage teaching process: "AI pre-grading + targeted classroom instruction + AI secondary optimization". Before class, the teacher assigns a narrative writing task titled "My University Life", requiring students to first complete the first draft independently and then upload it to the AI platform for preliminary grading. The teacher pre-sets the following AI prompt: "Please grade the following first draft of a Japanese narrative, annotate grammatical errors, inappropriate word choices, and monotonous sentence structure issues. Rewrite more than 3 simple sentences into natural compound or complex sentences while preserving the original meaning. Use N3-N2 level vocabulary and grammar that second-year Japanese majors have already mastered." AI can complete batch grading of the entire class's assignments within 5 minutes and generate personalized reports containing error types, revision suggestions, and sentence structure optimization examples.

During class, based on AI's grading data, the teacher delivers focused lectures on common issues across the class (such as tense confusion and particle errors) and then selects typical cases for group discussions. For example, the stacking of simple sentences in a student's first draft: "Watashi wa maiasa toshokan ni ikimasu. Hon o yomimasu. Tomodachi to hanashimasu." (I go to the library every morning. I read books. I talk with my friends) was optimized by AI to: "Watashi wa maiasa toshokan ni iki, hon o yominagara tokidoki tomodachi to benkyō no koto ni tsuite hanashimasu." (I go to the library every morning and sometimes talk with my friends about studies while reading books). On this basis, the teacher guides students to compare the differences in coherence between the two expres-

sions and explains the usage of the te-form and nagara-form. After class, students conduct a second revision based on the teacher's explanations and AI suggestions, and AI can recheck the revised content to ensure all basic errors are corrected.

Teaching practice data indicate that the sentence variety score of students in the experimental group increased from 2.13 ± 0.42 to 3.02 ± 0.51, representing a 41.8% improvement compared to the pre-test. An independent samples t-test revealed that this score was significantly higher than that of the control group ($t = 4.236$, $p < 0.001$). The average revision frequency per composition rose from 1.2 times in traditional teaching to 3.7 times, which was significantly higher than the 1.3 times of the control group ($t = 10.567$, $p < 0.001$), effectively enhancing students' awareness of writing revision.

4.2. Business Practical Writing Scenario: AI-Assisted Honorific Error Correction and Stylistic Transformation (Core Scenario with Distinctive Japanese Characteristics)

Teaching Objectives: To master the standard format of Japanese business emails, correctly use sonkeigo (respectful language), kenjōgo (humble language), and teineigo (polite language), and to be able to adjust writing style and tone according to different communicative scenarios.

The honorific system is a key and difficult point in Japanese writing teaching. In traditional teaching, it is difficult for teachers to provide detailed and targeted guidance on each student's honorific usage. In this scenario, AI performs three main functions: honorific error identification, stylistic transformation, and scenario simulation. For honorific error correction, the teacher pre-sets the following prompt: "Please check for honorific errors in the following Japanese business email, annotate the error types (misuse of sonkeigo/misuse of kenjōgo/inappropriate teineigo/lack of formal language), provide the revised correct expressions, and briefly explain the usage principles of Japanese honorifics."

For example, a student wrote in an apology email to a client: "Senjitsu no misu ni tsuite, watashi wa taihen mōshiwakenai to omoimasu. Ashita, anata ni o okuri ni narimasu shūseiban o kakunin shite kudasai" (Regarding the mistake the other day, I feel very sorry. Please check the revised version that I will send to you tomorrow). AI accurately identified two core errors: First, "o okuri ni narimasu" is sonkeigo (respectful language) used for actions performed by the other party, and kenjōgo (humble language) "o okuri shimasu" should be used here. Second, "anata" (you) is too casual in business contexts and should be changed to "Kisha" (your company). The revised content by AI is: "Senjitsu no misu ni tsuite, kokoro yori o ayami mōshiagemasu. Ashita, kisha ni shūseiban o o okuri shimasu node, go kakunin no hodo yoroshiku onegai itashimasu" (Regarding the mistake the other day, I sincerely apologize. I will send the revised version to your company tomorrow, so please kindly check it), accompanied by a comparison table of usage scenarios for kenjōgo and sonkeigo.

Furthermore, AI enables rapid conversion between different writing styles, such

as converting plain-form internal notices into formal business emails or organizing colloquial conversations into written reports. Teaching data demonstrate that the honorific accuracy rate of students in the experimental group increased from 51.9% ± 6.8% to 83.5% ± 5.3%, which was significantly higher than the 62.1% ± 6.7% of the control group ($t = 9.782$, $p < 0.001$). The format compliance rate of business emails reached 96% ± 2.1%, which was significantly higher than the 78.3% ± 4.5% of the control group ($t = 13.215$, $p < 0.001$).

4.3. Academic Writing Scenario: AI-Assisted Abstract Translation and Structure Construction

Teaching Objectives: To master the writing norms of Japanese academic paper abstracts, accurately translate Chinese literature abstracts, and clarify the basic logical structure of academic writing.

To address the weak academic writing foundation of Japanese majors, AI is primarily utilized for literature abstract translation, keyword extraction, and argumentative structure optimization. In the abstract translation session, teachers require students to complete the translation independently first and then conduct comparative revisions using AI. The pre-set prompt is as follows: "Please translate the following Chinese literature abstract into Japanese academic style, using formal written language and academic terminology, avoiding colloquial expressions, complying with the format requirements for abstracts of Japanese humanities and social science papers, and marking the parts you consider inaccurately translated or requiring manual verification."

For example, when translating the sentence "This study adopts the action research method to explore the application effects of generative AI in Japanese writing teaching," a student mistranslated "action research method" as "kōdō kenkyū hōhō". AI corrected it to "akushon risāchi hō" (the commonly accepted translation in Japanese academia) and supplemented the usage scenarios of this terminology. In the structure construction session, AI can generate the standard framework of Japanese academic abstracts (Research Background → Research Methods → Research Results → Research Conclusions) based on students' research topics, guiding them to gradually fill in the content.

Meanwhile, this study places special emphasis on academic integrity education. Students are required to complete writing independently before using AI for auxiliary revision and must indicate the scope of AI usage in their assignments. Teachers evaluate students' original contributions by comparing the differences between their first drafts and final versions, effectively mitigating the risk of academic plagiarism.

In summary, generative AI has demonstrated unique advantages in all three core writing scenarios, particularly in solving persistent pain points unique to Japanese teaching, such as honorific instruction and stylistic transformation. However, practical implementation has also revealed that AI still has limitations, including excessively rigid honorific expressions, insufficient understanding of cul-

tural contexts, and homogeneity of generated content, which necessitate targeted humanistic guidance and supplementation from teachers.

5. Values and Unique Challenges of Generative AI-Empowered Japanese Writing Instruction

The deep application of generative AI in Japanese writing instruction not only effectively addresses the long-standing pain points of traditional teaching but also drives the systematic transformation of teaching concepts and models. However, due to the uniqueness of the Japanese linguistic system and the technical limitations of existing large language models (LLMs), its application also faces distinctive challenges that differ from those in English teaching, which require continuous exploration and optimization in practice.

5.1. Core Application Values of Generative AI-Empowered Japanese Writing Instruction

5.1.1. Significantly Improving Teaching Feedback Efficiency and Breaking the Bottleneck of Teachers' Workload

In traditional Japanese writing instruction, teachers spend a great deal of time correcting basic errors such as grammar, particles, and tenses, making it difficult to provide in-depth pragmatic and cognitive guidance. Generative artificial intelligence enables batch real-time grading of assignments for the entire class, freeing teachers from mechanical and repetitive labor. Data from this study show that AI takes only 1 - 2 minutes to grade a Japanese composition of approximately 300 words, with an efficiency more than 20 times that of manual grading; the average weekly time teachers spend on assignment grading decreased from 12 hours to 2 hours, and the proportion of classroom time allocated to group discussions and personalized guidance increased from 20% to 60%.

5.1.2. Enhancing the Pertinence of Pragmatic Teaching and Breaking Through the Core Difficulties in Japanese Teaching

The honorific system, stylistic differences, and pragmatic rules are the top priorities in Japanese writing teaching, as well as the most intractable bottlenecks in traditional instruction. Generative artificial intelligence can accurately identify and correct students' problems such as honorific misuse and stylistic inconsistency and provide targeted revision suggestions and usage explanations. In this study, the honorific accuracy rate of students in the experimental group increased from 51.9% to 83.5%, and the format compliance rate of business emails reached 96%, which was significantly superior to that of the control group. For example, in the business apology email writing task in Week 8, the average number of honorific errors per composition was 2.1 in the experimental group, compared with 6.3 in the control group, among which the error rate of kenjōgo (humble language) misuse decreased from 42% to 11%. This result confirms that AI can effectively compensate for the deficiency of pragmatic training in traditional teaching and help students quickly master the language usage norms of Japanese.

5.1.3. Realizing Personalized and Precise Teaching to Meet the Needs of Students at Different Levels

Traditional Japanese writing teaching adopts a "one-size-fits-all" model, which makes it difficult to accommodate the learning needs of students with different foundations. Generative AI can generate customized learning suggestions and training materials based on students' writing proficiency and error types. For example, for students with weak foundations, AI focuses on correcting grammatical and lexical errors; for students with solid foundations, AI emphasizes optimizing sentence structure and logical expression. Research by He Mengyuan (2026) also points out that the deep integration of AI helps enhance the authenticity and comprehensive applicability of writing tasks and implements the educational philosophy of "teaching students in accordance with their aptitude".

5.1.4. Reducing Students' Writing Anxiety and Improving Learning Engagement and Initiative

The high difficulty of Japanese writing leads to widespread writing anxiety and insufficient learning motivation among students. The instant feedback and low-pressure learning environment provided by generative artificial intelligence can effectively alleviate students' psychological burden. Data from this study demonstrate that the average writing duration of students in the experimental group increased from 32.9 ± 5.7 minutes to 42.3 ± 6.5 minutes, which was significantly higher than that of the control group ($t = 4.128$, $p < 0.001$). The writing anxiety score decreased from 68.2 ± 7.5 to 45.6 ± 6.2, which was significantly lower than the 62.3 ± 7.4 of the control group ($t = 6.893$, $p < 0.001$). Students are no longer afraid of making mistakes and are more willing to try complex expressions and writing tasks, with significantly improved learning initiative and engagement.

5.2. Common Challenges in the Application of Generative AI

The application of generative AI in Japanese writing instruction also faces common risks similar to those in English teaching. First is the risk of technological dependence. Some students over-rely on AI to complete writing tasks, leading to a decline in their independent thinking and writing abilities, which is consistent with the problem of "superficial thinking cultivation" pointed out by Zhao Yuexin (2025) and Li Chengcheng (2025a). Second is the risk of academic integrity. The originality of AI-generated content is difficult to define, which facilitates plagiarism and ghostwriting for students, making effective supervision a persistent challenge in teaching management (Bu, 2025). Third is the risk of content homogenization. AI-generated content often suffers from stylized language logic and stereotypical expressions, which are detrimental to the cultivation of students' personalized expression and innovative capabilities (Zhao, 2025).

5.3. Unique Application Challenges in Japanese Writing Instruction

Compared with English teaching, the application of generative AI in Japanese writing instruction faces more complex technical and pedagogical challenges,

which constitutes the fundamental reason why research conclusions from English teaching cannot be directly transferred.

First, the complexity of the honorific system leads to frequent errors in AI generation. Japanese honorifics are divided into three major categories: sonkeigo (respectful language), kenjōgo (humble language), and teineigo (polite language), with strict hierarchical and situational distinctions that even native speakers often struggle with. This study found that although AI can identify most obvious honorific errors, it still lacks a nuanced grasp of "internal-external relationships" and "superior-subordinate relationships", often resulting in problems of "excessive honorifics" or "insufficient honorifics". For example, AI sometimes misuses teineigo appropriate for colleagues as formal honorifics intended for clients, leading to socially inappropriate expressions.

Second, the ability to accurately adapt to stylistic differences is insufficient. Japanese has multiple writing styles such as plain form, teineigo form, and formal form, with strictly demarcated usage scenarios. AI is prone to mixing writing styles when generating content, such as inserting colloquial expressions in academic papers or using plain-form sentences in business emails. In addition, AI lacks an in-depth understanding of the differences between written and spoken Japanese, resulting in sometimes overly rigid generated content that lacks natural and fluent linguistic intuition.

Third, there are deviations in the understanding of Sino-Japanese cultural contexts. Language is the carrier of culture, and Japanese writing embodies rich cultural connotations and expressive conventions. Due to the lack of deep comprehension of Sino-Japanese cultural differences, AI often produces culturally inappropriate expressions. For example, the opening greetings in AI-generated business emails sometimes fail to conform to Japanese business etiquette, or the expression of euphemistic tones is overly direct, resulting in suboptimal communicative effects.

Fourth, Japanese corpus resources are relatively scarce. Compared with English, the scale of Japanese Internet corpus resources is smaller, and high-quality corpora in professional fields are even more limited. This leads to the overall performance of large language models in Japanese being inferior to that in English, especially in specialized domains such as academic Japanese and business Japanese, where the accuracy and professionalism of the generated content require further improvement.

In summary, generative AI has brought unprecedented opportunities to Japanese writing instruction, but it also faces distinctive challenges. Only by fully recognizing these challenges and constructing a scientific and reasonable human-machine collaborative teaching model can we truly leverage the empowering value of AI and achieve the deep integration of technology and pedagogy.

6. Construction of a Human-Machine Collaborative Teaching Model for Japanese Writing Instruction

In response to the application values and unique challenges of generative AI, this

study proposes a human-machine collaborative teaching model characterized by "AI as technical support, teachers as leaders, and students as the center". It clarifies the division of roles between AI and teachers, constructs an application framework covering the entire teaching process, and achieves the deep integration of technology and pedagogy.

6.1. Core Principles of the Human-Machine Collaborative Teaching Model

The first is the principle of leveraging strengths and complementing weaknesses. AI undertakes mechanical and technical tasks such as grammar correction, vocabulary recommendation, format checking, and batch grading; teachers focus on humanistic and higher-order tasks including honorific context interpretation, cultural connotation explanation, logical thinking guidance, and emotional support. The two perform their respective duties and work in synergy.

The second is the principle of process orientation and thinking priority. AI should be regarded as a "cognitive collaborator" rather than a "ghostwriting tool". Students should be guided to improve their independent thinking abilities through interaction with AI and avoid technological dependence.

The third is the principle of linguistic feature adaptation. In view of the unique characteristics of Japanese honorifics, writing styles, and culture, AI prompt design should be optimized, and teachers' manual review and supplementary guidance should be strengthened.

The fourth is the principle of ethical norms and risk controllability. Establish clear AI usage specifications and improve the academic integrity supervision mechanism to ensure the morality and effectiveness of technology application.

6.2. Full-Process Human-Machine Collaborative Teaching Framework

Pre-class Stage: AI is responsible for learning situation analysis, material generation, and preview guidance. Teachers design targeted teaching content by accurately identifying students' weak links based on AI's data analysis of their past assignments; AI generates writing samples for different scenarios, honorific knowledge bases, and preview exercises to help students build up knowledge reserves in advance.

In-class Stage: AI is responsible for real-time assistance and common problem feedback. Students can consult AI about grammar and vocabulary issues at any time during the writing process, and AI provides revision suggestions in real time; teachers deliver focused lectures on common errors across the class summarized by AI, focusing on solving problems that AI cannot handle, such as honorific contexts and cultural expressions, and conduct group discussions and case analyses.

Post-class Stage: Construct a multi-dimensional evaluation system of "AI initial evaluation + teacher re-evaluation + student self-evaluation and peer evaluation". AI completes basic error correction and quantitative scoring; teachers conduct in-

depth evaluation of students' pragmatic appropriateness, logical thinking, and cultural adaptability, providing personalized humanistic feedback; students enhance their critical thinking and autonomous learning abilities through self-evaluation and peer evaluation.

6.3. Key Risk Prevention and Control Strategies

For the risk of technological dependence, clarify the boundaries of AI use, require students to complete the first draft independently before using AI for revision, and indicate the scope of AI use in their assignments; increase time-limited closed-book writing training and regularly evaluate students' independent writing abilities.

For the risk of academic integrity, introduce originality detection tools, compare the differences between students' first drafts and final versions, and focus on evaluating students' original contributions.

For the content error risks unique to Japanese, cultivate students' critical thinking and guide them to learn to identify errors in honorifics, writing styles, and cultural expressions generated by AI; establish a common error database and continuously optimize AI prompts to improve AI adaptability.

7. Conclusion and Future Prospects

7.1. Research Conclusions

Through 16 weeks of teaching practice, this study systematically explores the application pathways, values, and challenges of generative AI-empowered Japanese writing instruction. The findings are as follows: First, generative AI can significantly improve the effectiveness of Japanese writing instruction, demonstrating unique advantages, particularly in enhancing feedback efficiency, strengthening honorific and stylistic training, implementing personalized teaching, and reducing students' writing anxiety. Second, generative AI faces unique challenges in Japanese writing instruction that differ from those in English teaching, mainly including errors in honorific generation, deviations in stylistic adaptation, insufficient understanding of cultural contexts, and the scarcity of Japanese corpus resources. Third, constructing a human-machine collaborative teaching model of "AI technical support + teacher humanistic leadership" and clarifying the role division between the two and the full-process application framework are the keys to achieving the benign integration of AI and Japanese writing instruction.

7.2. Research Limitations and Future Prospects

This study still has certain limitations. The research sample only includes second-year Japanese majors from a single university, with a small sample size, so the generalizability of the research conclusions needs further verification. The research period is relatively short, and no long-term follow-up study has been conducted, making it impossible to evaluate the long-term impact of AI application on students' writing abilities.

In the future, research subjects and scenarios can be further expanded to conduct cross-university and cross-grade comparative studies. AI tools specifically tailored for Japanese writing instruction should be developed to enhance the understanding of honorifics, writing styles, and cultural contexts. Additionally, the application of generative AI in cultivating Japanese intercultural communication competence can be explored to provide more comprehensive support for the intelligent transformation of Japanese education.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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