

The Application of Human-Computer Collaborative Evaluation Model in Junior High School English Writing

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Based on sociocultural activity theory, this study conducted a 5-week English writing experiment with 42 Grade 9 students from a Leshan junior high school across five themes to explore the efficacy and implementation paths of a human-computer collaborative writing evaluation model. The study analyzes students' writing performance under the human-computer collaborative evaluation model and identifies complementary measures between intelligent tools' surface-level error correction and teachers' higher-order thinking guidance within human-computer collaborative teaching. Furthermore, based on the theory's core dimensions—tool mediation, division of labor, and rule regulation—the study establishes a human-computer collaborative evaluation model tailored to junior high school English writing. The findings reveal that the model significantly improves writing teaching efficiency: Intelligent tools serve as mediators by conducting surface-level language error correction, providing real-time feedback, and performing diagnostic analysis of learning data, whereas teachers focus on fostering students' higher-order writing thinking, discourse logical construction, and affective learning support, and this rational division of labor effectively stimulates students' writing motivation and autonomous revision ability, thus enabling steady progress in their writing performance. The study provides theoretical and practical references for digital transformation in junior high English writing assessment.

Keywords: sociocultural activity theory, English writing in junior high school, human-computer collaborative evaluation model

Introduction

The Compulsory Education English Curriculum Standards (2022 Edition) explicitly requires deep integration of information technology with English teaching and regards writing as a core part of students' comprehensive language competence. Against the background of fast-growing educational digitization, junior high school English writing teaching still has numerous problems. While growing research addresses automated writing assessment and teacher feedback, few systematically investigated a collaborative evaluation model. This gap highlights an urgent need—the necessity of constructing a principled pedagogical framework that transforms writing assessment from an isolated, product-oriented task into a dynamic, tool-mediated learning process embedded in social contexts.

To address this gap, this study, grounded in the sociocultural activity theory, developed and applied a human-computer collaborative evaluation model for junior high school English writing. This study is dedicated to enriching and expanding perspectives on digital writing instruction in basic education, deepening the

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theoretical application of sociocultural activity theory in technology-assisted English writing classrooms, and providing systematic, evidence-based practical references for the reform and evaluation innovation of junior high school English writing.

Literature Review

With the deep integration of artificial intelligence (AI) into education, a considerable number of scholars both domestically and internationally have focused on human-computer collaborative evaluation models.

Studies Abroad

In terms of theoretical research, Pérez-Quinones and Sibert (1996) find that stable interpretable feedback and mutual cognitive understanding as core prerequisites for human-computer collaborative system design. Isaacson (2014) concludes that the integration of human innovative inspiration and machine data processing capability is the core innovation of intelligent education in the new era. Guberina and Procházka (2026) build a human-AI collaborative teaching framework for K12 and higher education via cognitive and reliability-centered socio-technical theories.

In terms of practical application scenarios, Dikli (2006) explores the application value of automated scoring technology in writing teaching and confirmed that it can reduce the human cost of teaching evaluation and save grading time. Attali (2007) focuses on the feedback function of AI in writing teaching and found that AI can provide students with targeted feedback from multiple dimensions. Go (2025) studies generative-AI-supported L2 writing feedback, noting teacher-AI blended formative assessment relies on teachers' intervention to remedy AI limits for personalized high-quality guidance.

Studies at Home

In terms of theoretical research, Liu (2016) examines human-computer collaboration decision-making dilemmas, finding human wisdom is essential for human-computer collaborative teaching's complex problems. Zhang, Yan, and Sun (2026) explore mechanisms of human-machine collaborative educational resource production, identifying three hierarchical core features: controllability, quantifiability, and high-demand adaptability.

In terms of practical application scenarios, Li (2024) constructs a "teacher-machine-student" collaborative teaching model. Based on the Human-in-the-Loop and knowledge construction theories, Ke (2026) establishes a "teacher-AI-student" collaborative teaching model.

Although abundant studies exist on human-computer collaboration, few offer tailored designs for junior high school English writing. This paper aims to address that gap.

Theoretical Framework

Sociocultural activity theory, a foundational theoretical framework in psychology and education, was proposed by Vygotsky (1978). The theory highlighted the inextricable connections among human cognition, social interaction, and cultural tools. The theory encompasses five core concepts: the zone of proximal development (ZPD), mediation, scaffolding, activity, and collective activity system. These interrelated concepts constitute an integrated theoretical model. Drawing on these concepts, this study establishes a rigorous theoretical basis for investigating the effectiveness of human-computer collaborative evaluation in junior high school English writing, thereby ensuring the analytical depth and validity of the research findings. Guided by the zone

of proximal development, intelligent tools, teachers, and peers provide layered support for students' writing growth. Mediation connects learners and tasks via technical and symbolic tools, while scaffolding is dynamically offered and gradually faded. The whole process forms a purposeful activity system through which students internalize feedback. A collective activity system with clear division of labor is established, turning individual writing into collaborative practice and embodying the core of the theory.

Research Design

Research Questions

1. How does the human-computer collaborative evaluation model affect junior high school students' English writing performance?
2. What are the advantages and limitations of the human-computer collaborative evaluation model applied to junior high school English writing teaching?

Research Participants

The participants in this study were 42 9th-grade students from a junior high school in Leshan City, Sichuan Province. All participants possessed normal English language proficiency and had received systematic training in English writing.

Research Methods

This study employs Juku Correction Network. Throughout the research, Juku Correction Network was primarily used to support the assignment of writing tasks, submission, automatic essay evaluation, teacher evaluation, and student revisions, including the recording of data on students' writing revision processes.

This study also employs a quasi-experimental design to investigate the impact of human-computer collaborative evaluation on students' English writing proficiency. First, a pre-test was conducted: Students independently completed an English writing assignment in a multimedia classroom and submitted their drafts to a grading platform. Scores were determined jointly by Juku Correction Network and the researcher, with the average score serving as the pre-test score. This was followed by the intervention phase: Students received three types of feedback—automatic error correction from the grading platform, instructor comments on content and language, and peer-review based on a standardized rubric. Students revised their essays repeatedly based on this comprehensive feedback. After completing their revisions, students submitted their final drafts as the post-test, which were graded using the same method.

In addition, text analysis is a research method that systematically examines written content from multiple dimensions. It compares textual differences to identify changes in students' writing performance and writing quality. In this study, it was firstly used to compare the overall writing scores of the whole class. Then, the first and final drafts of one typical student were selected for in-depth text analysis from four dimensions: linguistic accuracy, content depth, structural coherence, and emotional resonance.

Evaluation System Design

This study conducted a 5-week teaching experiment. In Week 1, the teacher explained the functions of the "Juku Correction Network" platform, and students completed a guided writing task based on the writing prompt of the 2023 Leshan Senior High School Entrance Exam, in which students expressed their views on how teenagers can establish better family relationships. From the second week to the fifth week, complete one writing piece on

a different topic each week. At the same time, the evaluation process of human-machine collaborative writing, based on the model guided by the social-cultural activity theory (as presented in Figure 1), was referred to by Li (2024).

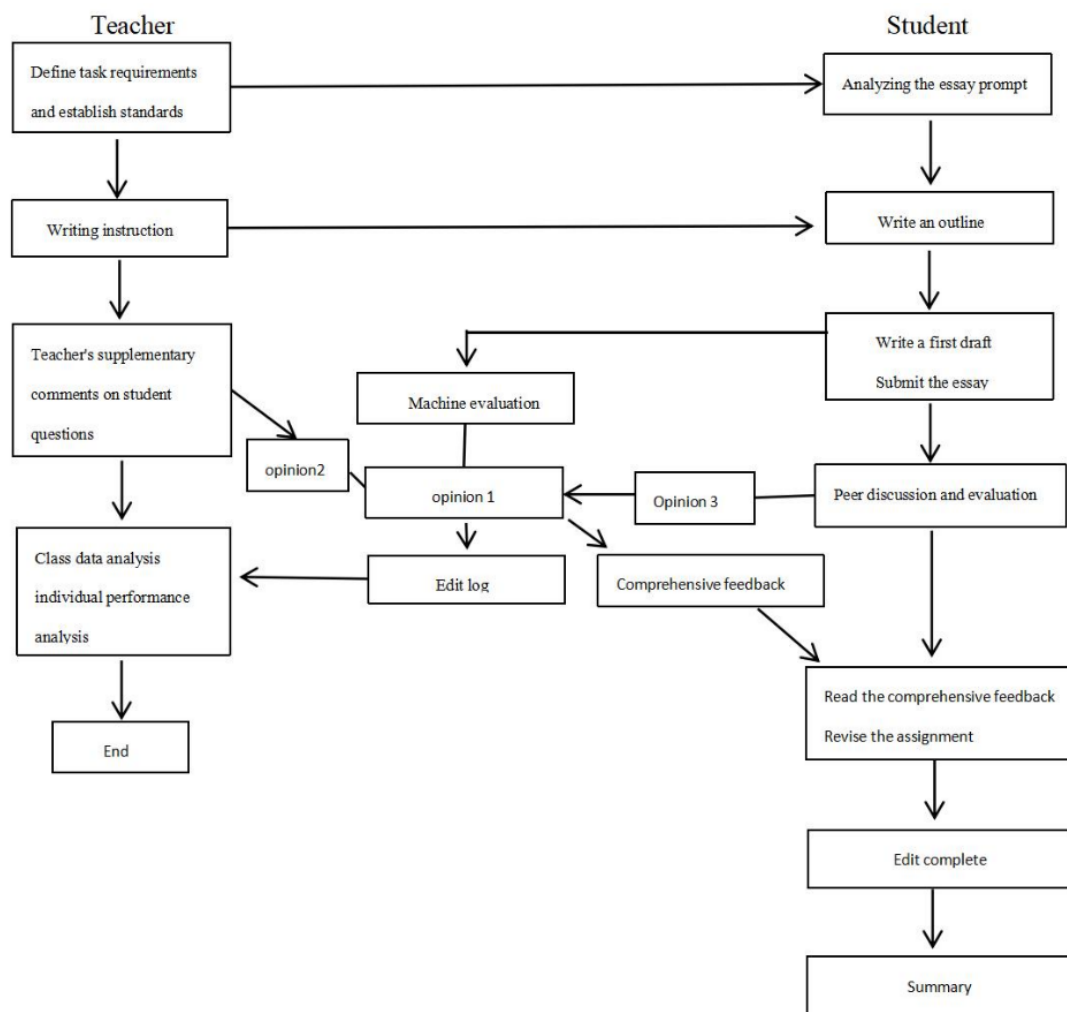


Figure 1. Evaluation process for human-computer collaborative writing (Reprinted from Li, 2024, p. 22).

Figure 1 presents the specific evaluation procedures of the writing task. In the writing stage, the teacher clarifies the writing task requirements, sets evaluation criteria, and provides writing guidance. Students analyze the essay prompt, design a writing outline, and start writing.

In the evaluation stage, students complete and submit their first drafts. The submitted drafts are immediately valuated automatically by the intelligent system. Meanwhile, students participate in group discussions and peer-review activities. Machine evaluation feedback (Opinion 1), the teacher's supplementary comments (Opinion 2), and peer feedback (Opinion 3), are integrated into comprehensive revision suggestions and recorded in the editing log. Students then revise their essays based on the overall feedback.

After finishing the revision, students conduct self-reflection. The teacher then evaluates students' writing performance from both whole-class and individual perspectives, so as to summarize the entire writing process.

Research Result

This case study employed a guided writing task based on the writing prompt of the 2023 Leshan Senior High School Entrance Exam. The task centered on how teenagers can develop harmonious family relationships. During the 5-week teaching experiment, all 42 students followed a standardized human-computer collaborative evaluation process consisting of “draft writing-machine diagnosis-teacher guidance-peer review-revision and optimization,” as illustrated in Figure 1. All first drafts and final drafts were evaluated both by the “Juku Correction Network” intelligent scoring system and by an English teacher. The final grade for each student was calculated by the average of the machine and teacher scores.

Statistical analysis revealed that the average score for the class’s first drafts was 78.3 points. After completing the full collaborative assessment and revision process, the average score for the final drafts increased to 79.7 points (see Table 1).

Table 1

Comparison of Scores Between the First Draft and the Final Draft of the Class

Score type	First draft	Final draft
Machine-graded average	77.6	79.2
Teacher-graded average	79.0	80.2
Whole-class average	78.3	79.7

Based on the comparison results of class data, this study found that students mainly have the following problems: insufficient accuracy in surface language, weak paragraph logic, and inadequate emotional expression. The following text, by combining specific cases, explains the application of the human-machine collaborative evaluation model in the revision of students’ English essays.

Intelligent Tool for Accurate Diagnosis of Surface Language Errors

Take student L’s essay as an example. The first draft of student L was scored by Juku Correction Network and received a score of 76 points. The platform accurately identifies grammatical errors in the initial draft and simultaneously offers a variety of vocabulary optimization suggestions, forming Opinion 1.

Teacher Guidance for Higher-order Thinking and Discourse Logic

The teacher provided precise guidance on the higher-order thinking and textual logic issues of student L composition.

First, the argument was weak. The teacher suggested that the student add logical adverbials to connect the behaviors with the theme.

Second, the transition methods were monotonous. The teacher recommended replacing advanced transitional phrases and optimizing the logical connection of the sentences.

Third, the ending was not well-optimized. The teacher suggested modifying it into a parallel sentence structure to align with the theme of family affection. The teacher’s annotations constitute Opinion 2. The teacher’s final score was 78 points.

Peer Review for Diverse Perspectives

Assign student L essay to student Z for mutual evaluation. During the mutual evaluation process, Z student first determined that the essay closely adhered to the theme of family education and had clear viewpoints. At the same time, it pointed out that the transitional words in the article were limited and the logical structure of the

paragraphs was weak; accurately identified the grammatical errors; and evaluated that the tone of the article was sincere, but the detailed descriptions were lacking and the persuasiveness was insufficient. The above peer suggestions constitute Opinion 3.

Then, Opinion 1, Opinion 2, and Opinion 3 are combined into a comprehensive set of feedback for the student. Student L revised the paper based on this feedback and submitted the final draft to the grading platform for final evaluation.

Since the score of first draft is calculated as the average of the teacher's evaluation and the machine's evaluation, therefore, student L's final score of first draft is 77. After the revision, the final teacher's score for student L was 83 points, the machine's score was 85 points, and the comprehensive average score was 84 points (see Figures 2 & 3).



Figure 2. Student L's first draft.

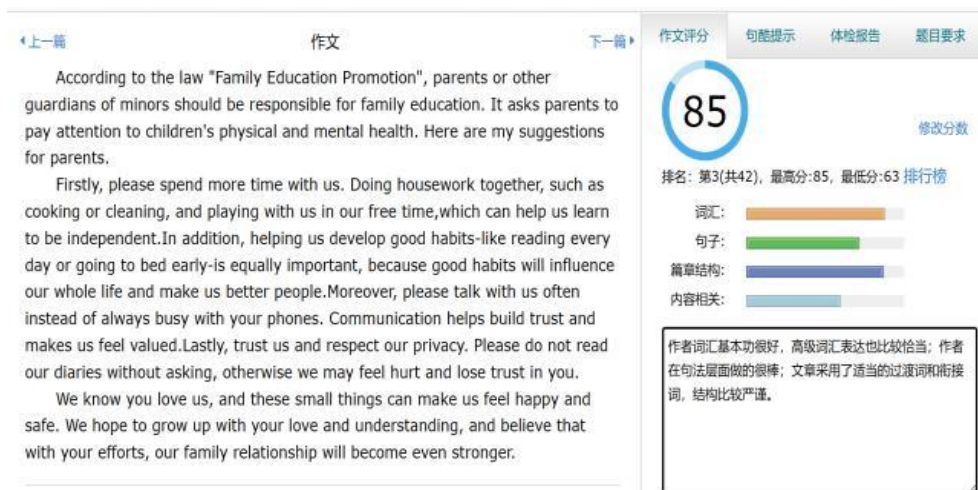


Figure 3. Student L's final draft.

Research Findings

Students have achieved noticeable writing progress, as the machine feedback efficiently helps students correct basic language errors while teacher feedback plays a key role in optimizing students' writing logic and

content structure, and the joint guidance of machine, teachers and peers effectively promotes the improvement of students' English writing ability. From the perspective of sociocultural activity theory, the human-computer collaborative evaluation model reconstructs the writing activity system and exerts significant positive effects on junior high school English writing.

Firstly, the model fully realizes the empowerment of tool mediation. In this process, the intelligent evaluation system, as an efficient mediating tool, can provide instant, objective feedback on students' writing drafts and accurately diagnose grammar, spelling, punctuation, and other surface-level language errors.

Secondly, teacher and peer feedback plays an irreplaceable role in fostering students' advanced writing abilities. Human-centered feedback makes up for the deficiency of machine evaluation in deep-level guidance and assists students in breaking through their zone of proximal development, thereby enhancing the overall quality of their writing.

Thirdly, the model constructs an interactive writing community that connects teachers, peers, and intelligent systems. The multi-agent feedback mechanism breaks the closed, isolated state of traditional writing practice, transforming it into an open, collaborative learning process.

In addition, the multiple-revision mechanism embedded in the model promotes the dynamic evolution of the entire writing activity system. Through repeated cycles of drafting, receiving feedback, revising, and resubmitting, students are guided to continuously refine their work.

In summary, these interconnected advantages demonstrate that the human-computer collaborative evaluation model is not merely a technical supplement to traditional writing assessment, but a holistic solution to the long-standing challenges in junior high school English writing. By combining the efficiency of machine evaluation with the depth of human guidance, the model creates a supportive, iterative learning environment that fosters both students' basic language skills and advanced writing competencies, making it a promising approach for enhancing writing instruction in the digital age.

Conclusion

Grounded in sociocultural activity theory, this study explores the application of the human-computer collaborative evaluation model in junior high school English writing. Against the background of educational digitalization and the requirements of *The Compulsory Education English Curriculum Standards* (2022 Edition), traditional English writing evaluation is troubled by delayed feedback, heavy teaching burden, and low student revision initiative. To solve these problems, this study took 42 9th-grade students from a junior high school in Leshan City as research participants, adopted quasi-experiment and text analysis as main research methods, and carried out a 5-week teaching experiment with five writing topics. Supported by the Juku Correction Network, this study constructed a "machine-teacher-peer" tripartite evaluation system and a complete process including draft writing, machine diagnosis, teacher guidance, peer-review, and revision. The improvement in students' writing scores shows that the human-computer collaborative evaluation model improves junior high school students' English writing performance and comprehensive quality. Intelligent tools effectively undertake surface-level language error correction and real-time feedback, while teachers focus on guiding students' higher-order thinking, discourse logic and emotional support. Peer-review enhances students' writing motivation and independent revision ability. The complementary division of labor among machine, teacher and peer promotes students' progress in language accuracy, content depth, and structural coherence.

However, this model still has several limitations. To begin with, students often lack sufficient feedback literacy to effectively interpret and utilize multi-source feedback. Another limitation is that the model lacks systematic periodic review and dynamic teaching adjustments. Without addressing these challenges, the model cannot fully realize its advantages.

In conclusion, this study provides a practical operational model and theoretical reference for integrating intelligent technology into junior high school English writing teaching. It helps to optimize the writing evaluation methods and promote the digital development of English teaching. At the same time, the researchers will continue to learn and practice, further overcome limitations, and strive for greater progress.

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