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An Empirical Study on the Effectiveness of Peer Review in Teaching English Writing in Higher Vocational Colleges

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Abstract: With the increasing demand for personalized and collaborative evaluation in higher vocational English writing teaching, problems such as delayed feedback, insufficient student participation, and lack of revision guidance in traditional writing teaching have gradually become prominent. The existing teaching control and evaluation mechanism is difficult to achieve refined identification and intervention of key links in the writing process (such as vocabulary use, sentence logic, paragraph cohesion, etc.). To this end, this paper introduces a structured peer evaluation teaching strategy to explore its role in improving students' English writing quality and autonomous learning ability. This strategy integrates social cultural theory, cooperative learning theory and self-efficacy theory, and builds a collaborative feedback mechanism based on the "zone of proximal development". The specific implementation includes scientific grouping, application of standardized evaluation rubrics, revision process annotation comparison, and teacher supervision and feedback throughout the process, focusing on multi-dimensional evaluation training of logic, language and content. The experimental results show that peer review significantly promotes the improvement of English writing ability of higher vocational students, and the effects of different peer review tools vary. Group A (using the Peerceptiv intelligent peer review system) and Group B (using the iWrite platform for peer review) performed best, with their average writing scores increased from 64.5 to 73.3 (↑13.6%) and 63.9 to 72.1 (↑12.8%) after seven weeks of teaching intervention, effectively promoting the improvement of their writing cognitive ability and collaborative revision awareness.

1. Introduction

As vocational education places increasing demands on students' comprehensive language proficiency, higher vocational English writing teaching is facing the challenge of transforming from traditional one-way teaching to an interactive collaborative learning model. As a core skill in

language learning, writing requires both professional guidance from teachers and cooperation and feedback among learners. In recent years, peer review, as a formative evaluation method, has shown unique advantages in promoting students' writing ability and stimulating their learning enthusiasm. Through peer review, students can not only obtain timely and diversified feedback but also deepen their understanding of language structure and expression skills in the process of evaluating others' works, and realize the internalization and transfer of knowledge.

Based on this background, this paper focuses on the practice of peer evaluation in English writing teaching in higher vocational colleges, and combines AI and Internet of Things technology to build a multi-dimensional intelligent evaluation system, aiming to explore the role of the system in promoting students' writing performance and cognitive development. This study designed an integrated teaching intervention of "reading - writing - evaluation - correction", adopted multiple sets of controlled experiments and data analysis to verify the effectiveness of the intelligent peer evaluation mechanism in improving the control of writing details, promoting collaborative learning, and optimizing teaching feedback, providing a theoretical basis and practical path for the reform of English writing teaching in higher vocational colleges.

2. Related Work

In recent years, artificial intelligence and technology-assisted tools have been increasingly used in English writing teaching. Related research explores their impact on students' writing ability, learning experience and teaching strategies from a multi-dimensional perspective. The specific performance is as follows:

Liu et al. proposed an AI English writing teaching model based on reflective thinking mechanism to improve students' writing quality and thinking depth. Through comparative experiments, it was found that this method significantly improved students' writing performance [1]. Bibi and Atta explored students' experience and satisfaction with the AI writing assistant ChatGPT, and analyzed its interface friendliness, personalized adaptability and writing improvement effect through questionnaires, interviews and usability tests. The results showed that students generally had a positive attitude and were satisfied with its writing assistance function [2]. Chen and Zhang analyzed the advantages and disadvantages of the chunk teaching method combined with corpus and mind map through empirical research, providing theoretical reference for high school English writing teaching [3]. Olowoyeye et al. explored the impact of Multimedia Instruction Approach (MIA) on the English writing ability of pre-service technical teacher students in southwestern Nigeria. A quasi-experimental design was used to compare the writing performance of the experimental group and the control group. The results showed that MIA significantly improved students' writing ability [4]. Hawanti and Zubaydulloevna found through a quasi-experiment on 73 college students that teaching based on AI chatbots can effectively alleviate students' writing anxiety [5]. Lam and Le investigated the views of teachers and students at Wan Lang University in Vietnam on the application of ChatGPT in English paragraph writing teaching. The results showed that although teachers and students generally recognized the advantages of its instant feedback and diversity of examples, they were neutral about its teaching support ability and creative help, and had doubts about its accuracy and reliability [6]. Cahyono et al. investigated the strategies of six university writing teachers in East Java, Indonesia, in using technology to teach EFL writing during the pandemic. The results showed that most teachers were able to cover five types of technology use, with self-assessment and peer assessment being the most common, and were able to implement all levels of ICAP activities [7]. Wulandari et al. used a questionnaire survey to explore the use of AI and technology tools by junior high school English teachers in academic writing and their impact on writing literacy. The results showed that teachers often used tools such as Grammarly,

QuillBot, ChatGPT, Mendeley, and Turnitin to correct grammar errors and accumulate vocabulary, and improve writing coherence and logic [8]. Muniruzzaman and Afrin investigated the main difficulties encountered by undergraduate English majors in academic writing in Bangladesh and ways to improve their writing skills. The results showed that students generally had poor grammatical skills, insufficient vocabulary, lack of writing skills, and interference from their native language, which led to their poor performance in academic writing tests [9]. Akbarani's study used a questionnaire survey, and the results showed that AI has both positive and negative effects in English teaching, and the key lies in its reasonable use [10]. Nguyen and Tran explored the application of artificial intelligence ChatGPT in language teaching. By letting ChatGPT evaluate ten essays written by advanced English students and reviewing them by senior teachers, the results showed that the scores were highly consistent [11]. Although existing studies have shown that AI-assisted writing has the potential to improve writing skills and learning experience, there are still problems with unclear mechanisms and insufficient evidence in terms of teaching depth, personalized support, and evaluation reliability.

3. Method

3.1 Theoretical Support and Teaching Significance of Peer Assessment

In recent years, with the in-depth development of the concept of formative assessment, peer assessment has gradually become an important means of language teaching, especially writing teaching. Its theoretical basis mainly includes sociocultural theory, cooperative learning theory, process writing theory and self-efficacy theory, etc., emphasizing social interaction, collaborative communication and cognitive co-construction in the learning process. The "zone of proximal development" theory proposed by Vygotsky is particularly critical, pointing out that individuals can achieve higher levels of development with the assistance of more experienced peers or mentors. In peer assessment, this theory is reflected in the formation of "scaffolding" support in language input, cognitive regulation and feedback interaction through mutual evaluation and discussion between students, so as to achieve the improvement of individual abilities.

Peer review is not only a process of evaluating other students' work but also a co-construction activity mediated by language. Students need to pay attention to the logic of expression, the accuracy of language and the coherence of content in their evaluation and feedback. This process promotes the simultaneous development of their critical thinking and language skills. In addition, in online education with large-scale learner participation, peer review has also been proven to be an efficient and practical means of collaborative learning.

3.2 Implementation Process of Peer Evaluation Strategy

In order to maximize the evaluation effect, a structured peer evaluation teaching strategy is adopted in the teaching process, which specifically includes the following four stages:

First, scientific grouping and teacher regulation.

When forming mutual evaluation groups, we configure them according to the students' English writing ability, interest characteristics and personality types, following the principle of "heterogeneity within the group and homogeneity between groups". Each group has 6 to 8 people, and strives to form a reasonable ability echelon within the group to achieve complementary cooperation and evaluation.

Second, standardize the evaluation process.

Students annotate, score and give brief feedback to other group members' post-reading writing based on a uniformly designed evaluation scale. The evaluation dimensions cover content

completeness, structural logic, language expression, grammatical accuracy and vocabulary use. This process emphasizes the cultivation of critical thinking and academic language expression. Students not only identify the pros and cons of others' works in mutual evaluation but also discover their own shortcomings in reflection.

Third, secondary writing and revision improvement.

After completing the mutual evaluation, students will revise according to the feedback received, use different colors to mark the revised content, and compare and analyze the first draft and the revised draft. Students are encouraged to strengthen language accuracy, sentence diversity and content depth in revision, and are required to recite the revised draft to deepen their memory and internalize language knowledge.

Fourth, teachers provide guidance and feedback throughout the process.

Teachers act as guides and supervisors during the mutual evaluation and revision process, and provide individualized guidance for issues such as unclear student feedback and inaccurate evaluation language. At the same time, after the activity, students' revised manuscripts are reviewed again, common problems are extracted, and concentrated explanations and feedback are given in subsequent classes to optimize teaching content and evaluation systems.

3.3 Teaching Reflection and Optimization Suggestions

Systematically embedding peer review into higher vocational English writing classes can effectively improve students' writing quality and autonomous learning ability. However, there are still some problems in teaching practice, such as some students' lack of mastery of evaluation language and vague evaluation content.

Therefore, it is recommended to focus on optimizing the following aspects in subsequent teaching:

Improve the evaluation scale and guidance sentence library: providing students with standardized evaluation terms and templates to improve the professionalism of feedback;

Strengthen training guidance before evaluation: improving students' evaluation literacy through model essay comments, simulated evaluation, etc.;

Strengthen teacher supervision mechanism: conducting spot checks and re-feedback on evaluation results to ensure evaluation quality;

Incorporate more writing task types: such as argumentative essays, expository essays, etc., to expand evaluation application scenarios;

Design phased achievement display activities: enhancing students' sense of participation and achievement, and improving learning motivation.

4. Results and Discussion

4.1 Experimental Purpose and Research Questions

This study aims to explore the application effect of peer assessment in the teaching of English writing in higher vocational colleges. Specific research questions include: (1) whether peer assessment can significantly improve students' English writing performance; (2) how students accept peer assessment activities and what their behaviors are; and (3) whether different peer assessment tools have different effects on teaching effectiveness.

4.2 Research subjects and grouping method

The experimental subjects are 154 first-year non-English major students from a vocational

college, who are randomly divided into four groups according to the principle of balanced class and writing performance:

Group A (Peerceptiv peer review platform, 38 people)

Group B (iWrite peer review platform, 40 people)

Group C (no peer review, independent writing after reading, 38 people)

Group D (reading comprehension only, 38 people)

Among them, Group A and Group B are experimental groups, Group C is the control group, and Group D is the control group to exclude the influence of the reading material itself on writing.

4.3 Teaching Intervention and Experimental Process

The experimental period is 7 weeks, and the design of "pre-test-teaching intervention-post-test" is adopted. The teaching intervention is based on the "read-test-write-evaluate" model, and the specific process is as follows:

Text material: O. Henry's novel "The Last Leaf" (simplified version, 1088 words) is used uniformly, and the language difficulty is equivalent to the domestic high school intermediate level.

Continuation task: All groups of students are required to complete a post-reading writing of more than 200 words after reading the original text. The content is required to be logically coherent with the original text, and translation or dictionary tools are not allowed.

Mutual evaluation operation:

Group A uses the Peerceptiv platform for two-way mutual evaluation, and the system automatically distributes essays and generates evaluation rubrics;

Group B uses the iWrite system and relies on embedded feedback tools for mutual evaluation;

Group C does not conduct mutual evaluation;

Group D only completes the original text comprehension test and does not participate in writing.

Writing restrictions and feedback design: Students need to complete five comprehension questions before continuing to write, and can only enter the writing stage if they answer at least four questions correctly to ensure the quality of reading. After the mutual evaluation, students in groups A and B need to make secondary revisions based on the feedback and mark the revised parts with different colors.

4.4 Data Collection and Analysis Methods

This study collects and analyzes data from the following three dimensions:

Changes in writing scores: Pre-test and post-test students using the CET-4 standard writing score to compare the improvement in writing performance among the four groups of students.

Behavioral performance and feedback content: Analyzing the frequency of specific writing behaviors such as vocabulary replacement and sentence structure adjustment in the revised manuscript; Count questionnaire feedback and class participation.

Teacher observation and interview: Combining classroom video recordings and teacher log records to evaluate students' participation, interactivity, and writing thinking performance during the mutual evaluation process.

As can be seen from Figure 1, peer evaluation significantly promoted the improvement of English writing ability of higher vocational students, and the effects of different peer evaluation tools are different. Group A (using Peerceptiv intelligent peer evaluation system) and Group B (using iWrite platform peer evaluation) perform the best, and the average writing score increases from 64.5 to 73.3 (↑13.6%) and 63.9 to 72.1 (↑12.8%) after seven weeks of teaching intervention, respectively, indicating that the systematic peer evaluation mechanism can effectively improve students' comprehensive writing ability in terms of content expression, structural logic and language

application. In contrast, although Group C (no peer evaluation, only completed the continuation task) also improves to a certain extent, from 64.2 to 68.2, the increase is 6.2%, but it is far lower than Group A and Group B, indicating that the lack of interactive feedback would significantly inhibit the improvement of writing ability. The score of Group D (only completed the reading comprehension task) remains basically unchanged (↑0.3%), further verifying the important role of writing training and peer evaluation in improving language generation ability.

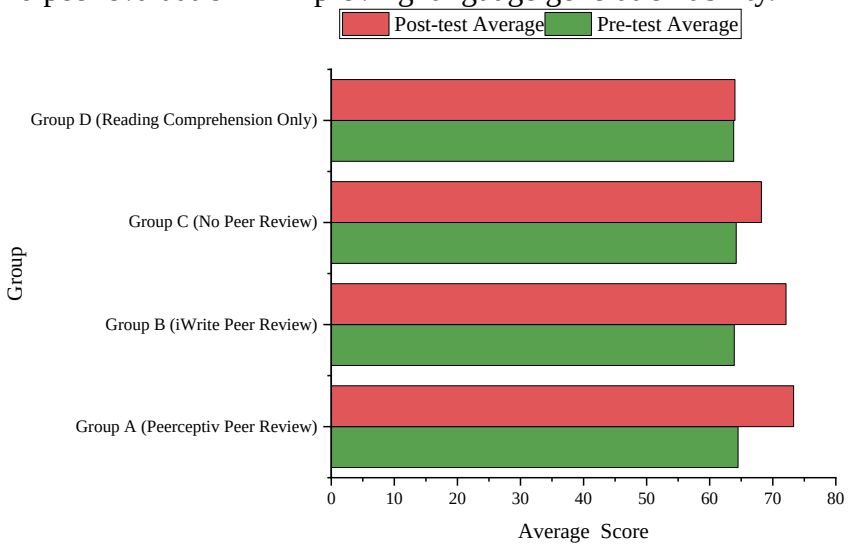

Figure 1 Comparison of average scores of the four groups of students before and after the writing test (unit: points)

Note: The test adopts the CET-4 writing scoring standard, with a full score of 100.

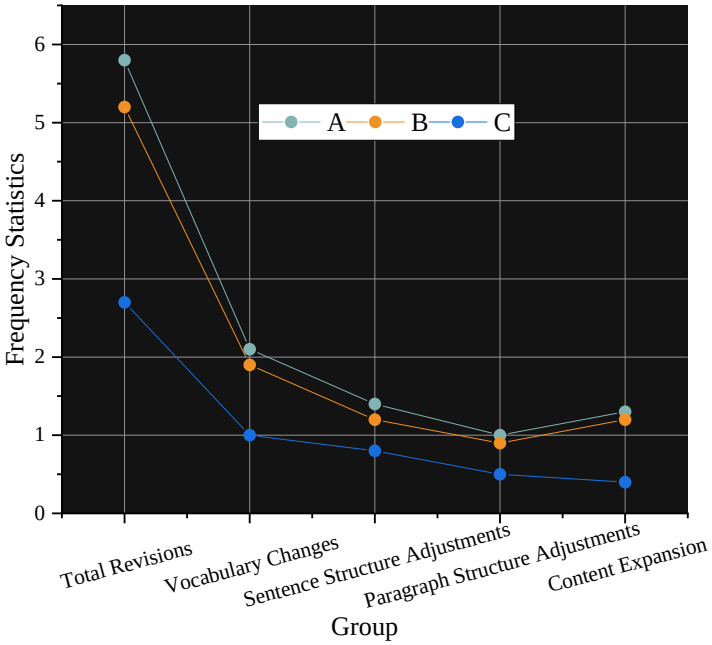

Figure 2 Statistics on the frequency of modification behaviors after mutual evaluation among students in different groups (average per capita)

Note: Statistics are based on the difference analysis between students' revised manuscripts and first drafts (random sampling of 40 copies), excluding spelling changes.

According to the statistical results of the data in Figure 2, Group A and Group B show a higher frequency of writing revision behavior after peer review. The total number of revisions per person in Group A reaches 5.8 times, and that in Group B is 5.2 times, which is significantly higher than the 2.7 times in Group C. This shows that the systematic peer review mechanism (especially supported by the AI platform) significantly improved students' review awareness and self-correction ability in the later stage of writing. Specifically, Group A performed better than Group B and Group C in four dimensions: vocabulary replacement (2.1 times), sentence adjustment (1.4 times), paragraph structure adjustment (1.0 times), and content expansion (1.3 times). Especially in terms of "content expansion", students in Group A are more inclined to add additional details or strengthen the argument after obtaining feedback, reflecting the enhancement of feedback-driven language generation and organizational ability. Group B also performs strongly in various revisions, but is slightly inferior to Group A, showing the differences between different peer review platforms in stimulating students' cognitive investment and depth of revision.

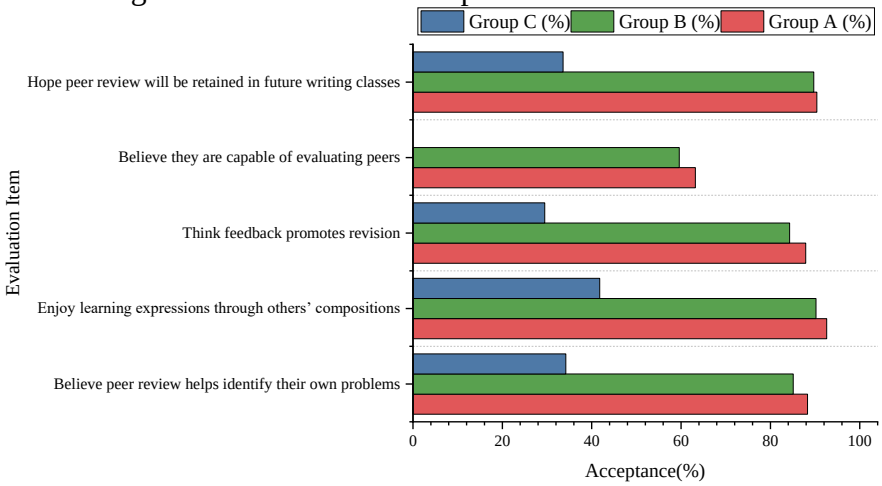

Figure 3 Survey on students' acceptance of peer assessment activities (percentage)

Note: The questionnaire is converted into percentages based on the Likert five-level scale. Group C had no experience in peer evaluation, and some items are omitted.

Figure 3 shows that students in Group A and Group B generally highly recognized peer evaluation activities, reflecting the positive effect of the intelligent peer evaluation mechanism in improving student participation and teaching satisfaction. Among them, the proportion of "liking to learn expression methods through other people's essays" in Group A and Group B reach 92.6% and 90.2%, respectively, which is much higher than the 41.8% in Group C, indicating that students who have undergone systematic peer evaluation training are more willing to learn writing skills from their peers' works, reflecting the transformation of learning methods from passive reception to active construction.

In terms of "believing that peer evaluation can help discover their own problems", the support rates of Group A and Group B are 88.3% and 85.1%, respectively, while Group C is only 34.2%, highlighting the irreplaceable role of peer feedback in improving writing metacognitive awareness. The item "feeling that feedback promoted writing revision" also shows a similar trend (87.9% in Group A, 84.3% in Group B, and 29.5% in Group C), further proving that mutual evaluation, as a key driving mechanism in the process of writing, can effectively encourage students to conduct secondary processing of language, structure, and logical expression.

From the teacher observation data in Table 1, Group A and Group B, which implement peer evaluation, are significantly better than Group C, which does not participate in peer evaluation, in terms of classroom participation, discussion activity, and writing quality improvement, which

verifies the positive role of the peer evaluation mechanism in stimulating classroom interaction and improving writing input. Group A scores 4.7 (out of 5) in classroom participation activity, which is much higher than Group C's 3.1. At the same time, the average frequency of questions/discussions in the class reached 12.3 times, reflecting that with the help of the structured evaluation framework of the Peerceptiv system, students are more willing to actively participate in language output and communicate with peers. Although group B is slightly lower than group A, it still shows a strong level of classroom participation (activity 4.4, discussion frequency 10.6 times), indicating that the iWrite platform also has a good interactive incentive effect. In terms of language quality, the revised essays of group A and B students are subjectively evaluated by the teacher as "significantly improved", while group C is only "limitedly improved", showing that the writing revisions without mutual evaluation support are insufficient in depth and breadth. Especially in dimensions such as structure and semantic connection, group C students often lacks external feedback guidance, resulting in superficial revisions. In addition, the difference in the frequency of teacher intervention also reveals the changes in teaching burden: due to the lack of an automated peer evaluation feedback system, teachers in Group C need to intervene more frequently in writing correction and organizational guidance (5.5 times/class hour); while Groups A and B rely on platform peer evaluation, and the frequency of teacher intervention is 3.2 and 3.8 times, respectively, which greatly reduces the evaluation pressure on teachers and enables them to focus more on macro guidance and individual support.

Table 1 Teacher observation records: comparison of classroom participation and peer evaluation performance

Item	Group A (Peerceptiv)	Group B (iWrite)	Group C (No Peer Review)
Classroom Engagement Level (1–5 scale)	4.7	4.4	3.1
Question/Discussion Frequency (times/class)	12.3	10.6	4.2
Language Quality Improvement After Revision	Significant	Significant	Limited
Teacher Intervention Frequency (times/class)	3.2	3.8	5.5

Note: The data are based on teacher diaries and video observation and analysis results. Activity is estimated as group average, and quality improvement is assessed as a subjective grade.

5. Conclusion

Based on sociocultural theory and process writing theory, this paper constructs and implements a peer-to-peer evaluation teaching system that combines artificial intelligence and Internet of Things technology, and explores its application effect in higher vocational English writing teaching. By designing a "read-write-evaluate-revise" teaching intervention and using multiple group control experiments, the study verifies that the intelligent peer-to-peer evaluation platform significantly improves students' vocabulary diversity, sentence complexity, and text structure logic, and promotes students' writing ability and cognitive development. In addition, the timely guidance of teachers and the application of multidimensional evaluation scales effectively ensured the quality of evaluation and enhanced students' learning enthusiasm and sense of cooperation. The experimental results show that peer evaluation is not only an important means to improve writing skills but also an effective way to promote students' independent reflection and critical thinking development. However, this study has certain limitations, such as the short experimental time, which failed to fully examine the long-term impact of the intelligent peer evaluation system; in addition, the user experience and operational convenience of the platform technology still have room for improvement. Future research can extend the intervention cycle, deeply explore the adaptability and

optimization strategies of intelligent peer evaluation in the context of interdisciplinary integration, and further improve the personalized feedback function of the evaluation system to promote the continuous innovation and deepening development of higher vocational English writing teaching.

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