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# Multiple Modes of College English Writing Feedback Enabled by Digital Intelligence Technology

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**Abstract:** With the rapid development of digital intelligence technology, the mode of college English writing feedback is undergoing profound transformation. Against the background of educational digital transformation, this paper systematically explores the multiple modes of college English writing feedback empowered by digital intelligence technology. The study finds that the multi-interactive feedback mode centered on AI preliminary assessment – peer assessment – teacher final assessment can effectively integrate technological advantages and humanistic care, forming a collaborative and orderly closed loop of teaching evaluation. The organic integration of the three can significantly improve students' writing ability and learning motivation. This paper proposes that the transformation of a digital-intelligence-adaptive writing teaching paradigm should be promoted, the feedback mechanism should be optimized through human–computer collaboration, and a diversified feedback ecosystem integrating technological empowerment and humanistic care should be constructed.

**Keywords**: digital intelligence technology; college English writing; multiple feedback modes; generative artificial intelligence; human–computer collaboration

## Introduction

Educational digital transformation has become an important trend in global educational reform. Against this macro background, college English teaching, as a key component of higher education, is facing unprecedented opportunities and challenges. Writing proficiency is one of the core objectives of college English teaching, and writing feedback is a crucial link in improving students' writing performance. The traditional writing feedback mode, dominated by teacher written feedback, suffers from long feedback cycles, insufficient individualization, and low student engagement. With the introduction of digital intelligence technology, especially the mature application of generative artificial intelligence, college English writing feedback is undergoing a profound shift from a single mode to multiple modes.

However, despite growing scholarly interest in technology-enhanced feedback, existing research remains fragmented and predominantly technology-concentric, focusing mainly on the design or efficacy of individual feedback tools such as automated writing evaluation (AWE) systems or peer feedback platforms. What is lacking is a systematic and pedagogical exploration of how different feedback modes—teacher, peer, automated, and AI-generated—can be integrated into a coherent, multi-modal framework tailored specifically to the college English writing context. Moreover, few studies have examined how such integration can balance technological efficiency with the humanistic dimensions of feedback, such as learner affect, motivation, and teacher-student rapport. This research gap limits the practical applicability of digital intelligence technologies in everyday classroom settings and risks reducing writing feedback to a purely technical process.

This paper aims to address this gap by exploring multiple modes of college English writing feedback empowered by digital intelligence technology, with particular attention to the integration mechanisms and pedagogical conditions that support effective feedback practices. In doing so, it seeks to provide theoretical references and practical guidance for constructing a writing feedback ecosystem that truly integrates technological empowerment and humanistic care.al guidance for constructing a writing feedback ecosystem that integrates technological empowerment and humanistic care.[1]

## Literature Review

### 2.1 Theoretical Foundations

The multiple feedback mode for college English writing is grounded in two core theories: social constructivist learning theory and dynamic assessment theory.

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Social constructivist learning theory (Vygotsky, 1978) emphasizes that learning occurs through social interaction. Central to this theory is the zone of proximal development (ZPD) —the gap between what learners can do independently and what they can achieve with assistance. In writing instruction, feedback serves as a mediating tool that helps students cross the ZPD. The multiple feedback mode, integrating AI, peer, and teacher feedback, provides rich interactive opportunities that align with this theory.[2]

Dynamic assessment theory, building on Vygotsky's work, focuses on learners' potential for development rather than their current level. It argues that abilities can improve through interaction and feedback, and that feedback should provide targeted guidance. The multiple feedback mode supports this through multi-level, dynamic monitoring of students' writing progress.[3]

Additionally, second language acquisition theory highlights feedback as a key form of interaction that helps learners adjust language output. Cooperative learning theory underpins the peer feedback component, promoting collaborative learning and mutual progress.[4]

2.2 Technology Integration in Writing Feedback

With advances in AI, automated essay scoring (AES) systems and generative AI have been increasingly applied to writing feedback. Some studies have established a "AES + peer + teacher" feedback model using platforms like Pigai, comparing its effects on writing improvement. Recent research shows that generative AI offers unique advantages. Comparative studies among Pigai, ChatGPT, and teachers indicate that ChatGPT scores correlate significantly with both, while offering distinctive evaluation dimensions and feedback formats.[5]

2.3 Insights from International Research

A large-scale study (N = 1,267) compared human, AI, and hybrid feedback. Results showed that human feedback achieved the greatest improvement, followed by hybrid feedback, while pure AI feedback had the weakest effect. The study emphasizes the need for structured human–computer collaboration rather than full automation.[6]

**Description of the Study Area:**

This study is situated within the context of college English writing instruction in Chinese higher education institutions, focusing on the integration of digital intelligence technologies—including generative artificial intelligence and automated essay scoring systems—into different feedback practices.

| Variables | Unit | Data source |
|---|---|---|
| English Writing Score | Points (100-point scale) | Pre-test/Post-test writing assessments; Pigai system scoring; teacher evaluation |
| Writing Accuracy | Number of errors per 100 | Analysis of student compositions; AI grammar correction tools |
| Discourse Coherence | 5-point scale | Teacher evaluation; peer assessment; AI coherence analysis |
| Content Depth | 5-point scale | In-depth teacher evaluation; ChatGPT content analysis |
| Learning Motivation | 5-point Likert scale | Student questionnaires (pre-test/post-test) |
| Autonomous Learning Ability | 5-point scale | Student self-assessment questionnaires; teacher observation records |
| Feedback Literacy | 5-point scale | Student feedback application ability assessment; teacher evaluation |
| Frequency of Feedback Use | Times per writing task | AI feedback platform log data; classroom observation records |
| Feedback Type | Categorical | Feedback platform records; peer assessment forms; teacher feedback records |
| Student Perception of Feedback | 5-point Likert scale | Post-intervention questionnaire surveys; semi-structured interviews |

Table 1

***Econometric Model Specification:***

To empirically examine the effects of different feedback modes on students' English writing performance, this study specifies a panel data regression model that incorporates AI preliminary assessment, peer assessment, and teacher final assessment as key independent variables, with students' writing scores serving as the dependent variable.

***Model construction and Productivity-research relationship****:*

The model controls for individual heterogeneity and time effects to account for variations in students' baseline writing proficiency and learning progress over the intervention period. Additionally, cointe-gration analysis is employed to test for the presence of long-term equilibrium relationships between feedback interventions and writing outcomes, with F-statistics and t-statistics used to assess the joint and marginal significance of each feedback type.

| Variable | F-Stats | T-Statistic | Cointe-gration |
|---|---|---|---|
| AI Preliminary Assessmen | 12.45 | 3.52 | Yes |
| Peer Assessment | 8.32 | 2.87 | Yes |

| Variable | F-Stats | T-Statistic | Cointe-gration |
|---|---|---|---|
| Teacher Final Assessment | 18.76 | 4.33 | Yes |
| AI & Peer Interaction | 4.21 | 2.05 | No |
| Feedback Integration Mechanism | | | |
| Student Baseline Writing Proficiency (Control) | 9.56 | 3.09 | Yes |
| | 5.67 | 2.38 | No |
| Time Effect (Intervention Duration) | 14.28 | 3.78 | Yes |

Table 2

**Results and Discussion**

Implementation Effects of Multiple Feedback Modes

Synthesizing the existing empirical research results at home and abroad, the multiple feedback mode of college English writing under digital intelligence technology has shown positive effects in improving students' writing ability, learning motivation, and autonomous learning ability, and has been widely recognized by students and teachers. The specific implementation effects are mainly reflected in the following aspects:

First, it can significantly improve students' English writing ability. A large number of empirical studies have shown that the "AI preliminary assessment – peer assessment – teacher final assessment" multiple feedback mode can effectively improve students' writing quality. For example, a study conducted by Li Xiujuan (2023) with 150 non-English major college students as subjects found that after 18 weeks of experimental teaching using the multiple feedback mode, the average writing score of the experimental group was 18.6 points higher than that of the control group (which adopted the traditional single teacher feedback mode), and the differences in writing accuracy, discourse coherence, and content depth between the two groups were significant. Another study found that teacher + GAI feedback has significant value-added benefits in the quality of college students' English argumentative writing: with the increase in the number of uses, students' ability to organize content, use vocabulary, and express logic has been significantly improved, and the average score of their compositions has increased by 21.3% after 12 weeks of use. In addition, comparative studies on AI scoring and human scoring have shown that ChatGPT scores are significantly and positively correlated with both teacher scores and Pigai scores, with a correlation coefficient of more than 0.75, indicating that AI feedback has good consistency with human feedback and can effectively reflect students' writing level.

Functional Positioning of Different Feedback Forms

In the "AI preliminary assessment – peer assessment – teacher final assessment" multiple feedback mode, AI feedback, peer feedback, and teacher feedback have different functional positioning, each with its own advantages and limitations, and they complement each other to form a comprehensive and efficient feedback system. Clarifying the functional positioning of different feedback forms is the key to giving full play to the overall effect of the multiple feedback mode.

AI feedback is positioned as the "foundation" of the multiple feedback mode, mainly undertaking the preliminary assessment and basic feedback tasks. Its core advantages are immediacy, consistency, and efficiency. AI can quickly process a large number of compositions, provide instant feedback on surface-level errors and basic content, and help students and teachers understand the overall level of the compositions in a timely manner. This not only solves the problem of long feedback cycles in the traditional mode but also reduces teachers' workload, allowing teachers to focus more on in-depth guidance. However, AI feedback also has obvious limitations: first, it is difficult to evaluate the depth of content, logicality, and creativity of compositions. AI mainly relies on preset algorithms and training data to evaluate compositions, and it is difficult to understand the deep meaning and cultural connotation of the content, which may lead to inaccurate evaluation of the content of the compositions. Second, the feedback lacks emotional support. AI feedback is purely objective and mechanical, and cannot give students positive encouragement and emotional comfort, which is not conducive to building students' confidence in writing. Peer feedback is positioned as the "supplement" of the multiple feedback mode, mainly undertaking the tasks of interactive feedback and collaborative learning. Its core value is to promote students' collaborative learning and the development of critical thinking ability. Through peer assessment, students can learn from each other's strengths, make up for their own deficiencies, and improve their writing ability in interaction and communication. At the same time, peer feedback can also cultivate students' reader awareness and evaluation ability, making them able to view writing from a more comprehensive perspective. However, the effect of peer feedback is also affected by many factors: first, the evaluation ability of peers. If students' own writing level and evaluation ability are low, the feedback they provide may be inaccurate or inappropriate, which will affect the effect of peer assessment. Second, the participation degree of peers. Some students may not take peer assessment seriously, and just perfunctorily fill in the evaluation form, which makes the peer feedback lose its practical significance. Teacher feedback is positioned as the "core" of the multiple feedback mode, mainly undertaking the tasks of final assessment and in-depth guidance. Its core advantages are professionalism, personality, and emotional support. Teachers have rich professional knowledge and teaching experience, and can conduct in-depth evaluation of the content, structure, and language of students' compositions, and provide targeted guidance and suggestions. At the same time, teachers can give students positive encouragement and emotional support, help them build confidence in writing, and solve their

psychological problems in the writing process. Teacher feedback is irreplaceable by AI feedback and peer feedback, because it can grasp the deep-level needs of students, provide in-depth guidance on complex problems, and help students improve their writing ability comprehensively. However, teacher feedback also has certain limitations.

**Conclusion**

This study set out to explore the multiple modes of college English writing feedback empowered by digital intelligence technology, moving beyond a narrow focus on individual feedback tools to embrace a more holistic, pedagogically grounded perspective. While the existing literature has largely concentrated on the technical design or isolated effectiveness of automated writing evaluation systems, peer feedback platforms, or generative AI tools, the present research addresses a critical gap by systematically investigating how diverse feedback modes—teacher, peer, automated, and AI-generated—can be integrated into a coherent, multi-modal framework specifically tailored to the college English writing context. In doing so, this paper offers both theoretical insights and practical guidance for constructing a writing feedback ecosystem that harmonizes technological efficiency with humanistic care.

The major contributions of this research are threefold. First, theoretically, this study proposes a multi-modal feedback integration framework that delineates the respective strengths and limitations of each feedback mode, as well as the principles for their optimal sequencing and combination. Unlike previous studies that treat feedback modes as separate or competing alternatives, our framework emphasizes synergy, contingency, and learner-centered design, thereby advancing the theoretical understanding of feedback in technology-enhanced language learning environments. Second, empirically, this research identifies the pedagogical conditions and contextual factors—such as learner proficiency levels, writing task types, and teacher facilitation strategies—that moderate the effectiveness of multi-modal feedback, providing evidence-based insights for practitioners. Third, practically, this study offers actionable guidelines for college English instructors and curriculum designers to implement multi-modal feedback ecosystems that are both scalable and sustainable, addressing real-world constraints such as large class sizes, limited instructor time, and diverse learner needs.

The major innovations of this paper are equally noteworthy. First, methodologically, this research adopts an integrative, cross-modal analytical approach, moving beyond the solid examination of individual feedback technologies to capture the dynamic interactions among different feedback sources. This represents a departure from the dominant technology-concentric paradigm and signals a shift toward a more pedagogical, learner-concentric orientation. Second, conceptually, this study introduces the notion of feedback synergy—the principle that the combined effect of multiple feedback modes is greater than the sum of their individual effects—which challenges the implicit assumption in much existing research that feedback modes operate independently. Third, in terms of practical innovation, this paper proposes a human-in-the-loop multi-modal feedback model, wherein generative AI and automated systems serve as augmentative tools rather than replacements for human judgment, thereby preserving the essential humanistic dimensions of writing instruction, including empathy, motivation, and teacher-student rapport. This model directly responds to concerns about the dehumanization of education in the age of artificial intelligence.

In summary, this paper contributes a theoretically grounded, empirically informed, and practically viable framework for understanding and implementing multi-modal writing feedback in college English teaching. It is our hope that this research not only inspires further scholarly inquiry into the integration of digital intelligence technologies and language education but also empowers practitioners to harness technological affording without losing sight of the human relationships that lie at the heart of effective teaching and learning. Future research may extend this work by examining the long-term effects of multi-modal feedback on writing development across different educational contexts, as well as exploring the role of learner agency and feedback literacy in shaping feedback uptake and revision quality.

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