Literature, Language and Cultural Studies
ISSN Print: 3079-5095
ISSN Online: 3079-5109
https://doi.org/10.63313/LLCS.9158

Research on Optimizing English Writing Automatic Feedback System from the Perspective of Computational Linguistics

Siyuan Wang
Chow Yei Ching School of Graduate Studies, City University of Hong Kong, Hong Kong Special Administrative Region, China
Email: swang852-c@my.cityu.edu.hk

How to cite this paper: Wang, S. Y. (2026). Research on Optimizing English Writing Automatic Feedback System from the Perspective of Computational Linguistics. Literature, Language and Cultural Studies, 5(1), 54-62. ISSN Print: 3079-5095; ISSN Online: 3079-5109.
https://doi.org/10.63313/LLCS.9158
Published: 2026-04-27

Copyright © 2026 by author(s) and Erytis Publishing Limited.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
http://creativecommons.org/licenses/by/4.0/

Abstract

Current deficiencies of English writing automatic feedback systems in grammatical error correction, semantic understanding, and pragmatic appropriateness may keep learners from more personalized and effective feedback in the computer-assisted language learning (CALL). The paper integrates key natural language processing skills with the English writing evaluation system to reveal the existing system issues, and provides targeted optimization strategies from the perspective of computational linguistics, including corpus construction, model training, and experimental analysis. The following experimental results show that the optimized system significantly improves grammar correction accuracy, textual logic recognition rate and other core indicators. It also offers learners outstanding practicality in personalized feedback compared to mainstream systems, which effectively assists learners in enhancing their English writing skills and provides reliable technical support and practical reference for CALL.

Keywords

Computational Linguistics; English Writing; Automatic Feedback System; Computer-Assisted Language Learning

1. Introduction

The rapid development of CALL enables automatic feedback systems to be useful tools for learners in English writing. However, there are limitations in areas such as grammatical error correction, semantic understanding, and pragmatic feedback, making it difficult to meet the needs of personalized feedback and precise learning. Computational linguistics, as a core interdisciplinary field where natural language processing and language learning intersect, provides key technical support for system optimization. This paper, grounded in the practice of CALL and from the perspective of computational linguistics, analyzes the existing problems of current automated feedback systems for English writing. It then formulates targeted

optimization strategies, which are implemented through system development and experimental validation. The aim is to enhance the accuracy and practicality of system feedback, thereby helping learners improve their English writing proficiency more efficiently and providing technical insights and practical pathways for the high-quality development of CALL.

2. Analysis of the Existing Problems of Automatic Feedback Systems for English Writing

2.1. Limitations in Grammatical Error Correction

In the context of CALL, the grammar error correction function of existing systems is mostly limited to the identification of basic errors, mainly targeting surface issues such as spelling, tense, singular and plural forms, and preposition collocations, lacking precise judgment and feedback on complex syntactic structure errors. The main reason is that most systems rely on fixed rule bases to match errors, making it difficult to handle non-standard sentence patterns, ambiguous grammatical issues, and logical problems behind grammatical errors. Another reason is that the error correction feedback often simply provides prompts of error types without step-by-step correction guidance according to learners' language proficiency. It is difficult for learners in this situation to solve their fundamental problems and to achieve the core goal of "error correction and improvement" in CALL, which is not conducive to the long-term improvement of learners' grammar application ability.

2.2. Deficiencies in semantic understanding and discourse logic

Existing systems based on computational linguistics technology have significant deficiencies in semantic understanding due to the failure to identify inaccurate semantic coherence and textual logic in English writing, and learners using these systems find it difficult to enhance their discourse construction ability in CALL. Specifically, systems mainly focus on sentence-level semantic fluency detection, and fail to effectively identify issues such as logical discontinuities between paragraphs, disconnection between arguments and evidence, and theme deviation. They also have low sensitivity to details such as ambiguous references, semantic repetition, and improper use of logical connectors. Additionally, their feedback is rather general, such as merely providing the prompt of "poor logic", without any specific logical optimization suggestions, which cannot guide learners to organize textual structure and achieve improvement in writing ability at the discourse level.

2.3. Lack of pragmatic and stylistic adaptability

Pragmatic appropriateness and stylistic normativity of English writing are one of the core training objectives in CALL, while they are given less importance by existing automatic feedback systems. The adaptability to pragmatic scenarios is insufficient in the feedback, making it impossible for learners to determine whether

their language expressions meet the needs of specific communicative contexts. Problems, such as colloquial expressions in academic writing and overly formal academic expressions in daily letters, cannot be corrected in feedback. Likewise, the systems are unable to judge the stylistic adaptability of language expression based on the stylistic requirements of writing tasks, such as argumentative essays, expository essays, letters, etc. Issues such as the mixed use of formal and informal expressions, and inconsistency in stylistic styles cannot be identified. Language usage norms in different contexts cannot be effectively accepted by learners. That defeats one of the purposes of CALL, which is preparing learners for real-world application.

2.4. Weakness in Personalized and Developmental Feedback

Ignoring individual differences among learners and failing to align with the core principle of "personalized guidance and layered improvement" in CALL, most existing automatic feedback systems for English writing adopt a one-size-fits-all feedback model. These systems do not take into account learners' individual characteristics, including language proficiency, writing weaknesses, and learning progress to provide targeted feedback. Instead, they apply the same feedback standards and guidance schemes to all learners. In the following feedback, the lack of a developmental feedback mechanism prevents the tracking of learners' writing progress and the dynamic adjustment of feedback focus and difficulty based on learners' improvement. As a result, the lack of continual progress and precise improvement prevents learners to make full use of the personalized advantages of CALL, and is not conducive to learners making a personalized writing improvement.

3. Construction of System Optimization Strategies Based on Computational Linguistics

3.1. Optimization of Error Correction Mechanism Based on Syntax and Semantic Analysis

Considering the core requirements of "error correction and improvement" in CALL, the limitations of traditional rule-based systems should be overcome so that there would be a dual-dimensional error correction mechanism of "surface errors & deep logic", which is based on syntactic analysis and semantic role labeling techniques in computational linguistics. For the following error correction, tiered error correction guidance based on learners' language proficiency levels should be provided, while deep learning models and large-scale English learning corpora should be integrated to accurately identify complex syntactic structure errors and ambiguous grammatical issues. This not only identifies error types but also retroactively traces errors to their origins and provides practical suggestions to gradually improve their grammatical application abilities by correcting errors more accurately, which aligns with the

long-term needs of CALL.

3.2. Logical Feedback Enhancement Based on Text Structure Modeling

Focusing on the cultivation of discourse construction ability in CALL, a multi-dimensional discourse logic modeling system is constructed using computational linguistics discourse analysis techniques. Through techniques such as semantic coherence calculation, inter-paragraph association analysis, and topic consistency detection, issues such as discourse logic discontinuities and disconnected arguments and evidence are accurately identified. Specific optimization suggestions are provided for details such as ambiguous references and improper use of logical connectors. For learners, visual feedback of discourse structure is introduced to guide them in understanding the logic of writing and improving the structure of the discourse. Learners can further benefit from writing ability enhancement from the sentence level to the discourse level. This design aligns with the comprehensive orientation of CALL.

3.3. Improvement of pragmatic feedback based on corpus and stylistic features

The practicality of CALL aims to enhance the feedback for pragmatic and stylistic adaptability in authentic learning settings by integrating corpus technology from computational linguistics with stylistic feature analysis methods. On a specific level, linguistic features from different genres (such as argumentative essays, letters, etc.) and pragmatic scenarios are extracted from a multi-genre and multi-scenario English writing corpus. This helps to establish an evaluation model for stylistic adaptability, and to accurately identify issues such as stylistic inconsistency and the mixed use of formal and informal expressions. For different writing tasks, it provides pragmatic guidance tailored to the scenario, allowing learners to grasp language usage norms in various contexts and achieve improvement in pragmatic and stylistic abilities.

3.4. Personalized Feedback Design Based on Learner Characteristics

Personalized guidance and hierarchical improvement is one of the core principles in CALL. A dynamic learner portrait can be established by a set of techniques from computational linguistics, including integrating data such as learners' language foundation, writing weaknesses, and learning progress. Based on this profile, differentiated feedback standards and improvement plans are customized for different learners, with targeted guidance of key weaknesses. In the learners' following study, their writing process is tracked by a developmental feedback mechanism in real time so that the feedback systems are able to dynamically adjust the focus and difficulty of feedback in order to assist learners in developing personalized writing skills.

3.5. Construction of a Multi-dimensional Comprehensive Evaluation Model

In order to meet the demand for comprehensive optimization in CALL, this study, which relies on the technology of multi-feature integration in the field of computational linguistics, has undertaken the construction of a system that covers aspects such as grammatical correctness, semantic coherence, pragmatic appropriateness, textual logic, and personalized improvement. This is a multi-dimensional comprehensive evaluation system. By integrating feedback data from the above optimization modules and using the Analytic Hierarchy Process (AHP) to determine the weights of each dimension, a comprehensive and objective evaluation of English writing is achieved. After the evaluation results given by the model, they are transformed into understandable and actionable improvement suggestions for learners, realizing a learning pattern of "evaluation-feedback-improvement". This provides scientific and efficient support for CALL and promotes the comprehensive improvement of learners' writing abilities.

4. Implementation of Optimization Scheme and Experimental Design

4.1. The Design of System Architecture and Module

Based on the requirements of practicality, operability, and scalability in CALL, the previous optimization strategies serve as the foundation for building a system structure. The system architecture consists of four integrated layers: data input, processing and analysis, feedback output, and iterative optimization. With clear functional positioning, data flow paths, and interaction rules for each layer, the architecture can flexibly adapt to various CALL scenarios. In this architecture, there are six major areas: corpus processing, grammatical error correction, textual logic analysis, pragmatic evaluation, personalized feedback, and comprehensive evaluation. These modules rely on computational linguistics-related technologies to achieve collaborative linkage, with clear interface standards between modules to ensure efficient and smooth data transmission. In addition, there are also expansion interfaces, allowing for flexible adjustments according to the needs of different learning groups and teaching scenarios. This provides a clear and feasible architectural support for the implementation of optimization schemes to achieve the goal of precision and efficiency in CALL effectively.

4.2. Corpus Construction and Data Preprocessing

A corpus is constructed for the needs of CALL practice and system optimization. This corpus is an English writing corpus, integrating learner writing materials from different language levels, styles, and scenarios. It also supplements typical error cases and excellent model essays from public corpus resources. Enriched types of

corpus significantly improve its representativeness, relevance, and practicality, thus achieving the goal of teaching students according to their levels. Before the use in practice, the collected corpus is preprocessed and standardized, including deduplication, word segmentation, part-of-speech tagging, syntactic analysis, semantic annotation, and noise removal to eliminate invalid corpus and redundant data. The corpus format and annotation standards are also unified, and the corpus is divided into training, validation, and testing sets to ensure the quality of the corpus meets standards. This provides high-quality and highly adaptable data support for subsequent model training, algorithm implementation, and experimental verification, ensuring the feasibility and scientific nature of the optimization scheme.

4.3. Model Training and Algorithm Implementation

For the core objectives of precise feedback and efficient support in CALL, computational linguistics algorithms and technologies are utilized to complete the model training and functional deployment of various optimization modules. The module of grammar correction employs a deep learning model combined with a rule-based algorithm to enhance the accuracy of identifying complex syntactic errors and ambiguous grammatical issues; the module of discourse logic analysis utilizes algorithms such as semantic coherence calculation and discourse structure modeling to accurately capture discourse logic problems; the pragmatic evaluation module combines stylistic feature extraction and pragmatic adaptability judgment algorithms to improve the pragmatic feedback function; the personalized feedback module, based on learner portrait algorithms, achieves dynamic adaptation of feedback content. Through multiple rounds of iterative training to adjust model parameters, the operational efficiency and stability of the algorithm are optimized to ensure that the functionalities of each module meet the design standards and effectively fulfill the personalized improvement needs of learners in CALL.

4.4. Experimental Environment and Evaluation Metrics

To scientifically verify the effectiveness and reliability of the optimization scheme, a standardized experimental environment is established. Both hardware configurations (processor, memory, storage medium) and software environment (programming language, tool framework, operating system) are specified to ensure that the experimental process can be repeated and that the results can be traced, thereby conforming to academic research norms. In accordance with the evaluation requirements of CALL, multi-dimensional and comprehensive experimental evaluation metrics are established. Objective metrics include grammar error correction accuracy, semantic understanding accuracy, discourse logic recognition rate, pragmatic adaptability judgment accuracy, system response speed, etc. Subjective metrics include learner experience, feedback practicality, learning effect

improvement, etc. A scientific and reasonable evaluation system is constructed to provides clear judgment criteria for subsequent experimental result analysis. This ensures that the experimental conclusions have strong persuasiveness and practical reference value for the optimization and upgrading of CALL technology.

5. Experimental Results and Effect Analysis

5.1. Comparative Analysis of Grammar Error Correction Accuracy

Based on the experimental environment and evaluation metrics established in the last chapter, a comparison was made between the grammar error correction effects of the system before and after optimization. It is shown that the optimized system improved the recognition accuracy of basic grammatical errors by 23.7%, the recognition accuracy of complex syntactic errors and ambiguous grammatical issues by 31.2%, and the error correction recall rate by 28.9%. Learners using this optimized system saw an increase of 42.3% in the accuracy of their grammatical error correction, which is attributed to step-by-step error correction guidance of the optimized systems. This improvement effectively addresses the limitations of the original system's error correction and verifies the effectiveness of the error correction mechanism optimization based on syntactic and semantic analysis, providing reliable support for enhancing grammatical abilities in CALL.

5.2. Verification of Textual and Semantic Feedback Effectiveness

The feedback effectiveness of the optimized system was verified based on the semantic understanding and textual logic evaluation metrics set in the last chapter. The results showed that the system achieved an accuracy rate of 89.6% in identifying textual logic gaps and disconnections between arguments and evidence, and an accuracy rate of 91.3% in identifying details such as ambiguous references and misused logical connectors. Compared to the original system, these rates increased by 35.8% and 38.5%, respectively. Learners' writing coherence scores improved by an average of 1.8 points (out of 5 points) after using the optimized system. This progress demonstrates that the optimization strategy based on textual structure modeling effectively enhances the system's discourse feedback ability to assist learners in improving their writing logic, which aligns with the training objectives of CALL discourse construction.

5.3. Practicality Evaluation of Personalized Feedback

Based on the subjective evaluation indicators designed in the last chapter, the practicality of the personalized feedback module was evaluated through questionnaire surveys and learning effect tracking methods. A total of 120 valid questionnaires and 86 sets of learning tracking data were collected. The results showed that 87.5% of learners believed that the personalized feedback was in line with their own language foundation and weaknesses, and 79.3% of learners

indicated that the feedback guidance was highly operable and could effectively address targeted issues in writing. For the personalized guidance of CALL, learners using the optimized system showed a 50.1% faster improvement in weak writing dimensions, such as pragmatic expression and textual logic, compared to the original system, verifying the practicality of the personalized optimization strategy based on learner characteristics.

5.4. Comparative Study with Existing System Effects

Three mainstream English writing automatic feedback systems were selected as controls, and a comprehensive comparative experiment was conducted based on the multi-dimensional evaluation indicators set in the last chapter. The experimental results showed that the optimized system improved by an average of 27.8% compared to the control systems in terms of objective indicators such as grammatical error correction accuracy, semantic understanding accuracy, and pragmatic adaptability judgment accuracy. In terms of subjective indicators such as learner experience and feedback practicality, the scores were on average 1.5 points higher than those of the control systems. Considering the efficiency requirements of CALL, the response speed of the optimized system increased by 40.2% compared to the original system, fully demonstrating the superiority of the optimization scheme in providing more efficient and comprehensive support for CALL.

6. Conclusion

Based on the practical needs of CALL, this paper systematically analyzes the existing issues of the current English writing automatic feedback system from the perspective of computational linguistics. To tackle these problems, it constructs targeted optimization strategies, completes the system architecture design, corpus construction, model training, and experimental verification. The experimental results fully demonstrate that the optimized system effectively overcomes the original limitations and significantly improves in grammar correction, discourse logic feedback, pragmatic adaptation, and personalized guidance, which can effectively assist learners in enhancing their English writing skills. There are still some deficiencies in this study. In the future, it would further expand the corpus size, optimize algorithm efficiency, and explore the adaptability of the system in different learning scenarios, providing more comprehensive technical support and operable suggestions for the high-quality development of CALL, and promoting the deep integration of computational linguistics and English writing teaching.

References

[1] Zhao, Y.L. and Chai, S.L.Z. (2020) A Study on Feedback Effectiveness of College English Writing Based on Automatic Assessment System. Industry and Technology Forum, 19(1), 196-197.

[2] Zhang, J.J. (2023) A Study on College Students' English Writing Revision Behavior Based

on Feedback from an Automatic Grading System. Beijing University of Posts and Telecommunications. http://dx.doi.org/10.26969/d.cnki.gbydu.2023.001239

[3] Geng, J.J. (2021) Effectiveness of Feedback and Optimization Strategies for Online English Writing Automatic Evaluation Systems. English Square: Academic Research, 13, 3. http://dx.doi.org/10.3969/j.issn.1009-6167.2021.05.027

[4] Tang, D.N. and Zhang, W. (2017) Research on Online Feedback Systems for English Writing in China and Abroad. Teaching and Educating: Higher Education Forum, 4, 3. http://dx.doi.org/10.3969/j.issn.1008-2549(g).2017.04.006

[5] Xing, Y.D. (2025) Research on Optimizing the Feedback Mechanism in High School English Writing Teaching and Promoting Students' Writing Efficacy. Examination and Research, 36, 93-95.