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Enhancing student writing feedback through teacher–AI collaboration in higher education

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Abstract

The objective of this research is to explore the collaborative role of AI and teachers in providing feedback on written assignments. Teacher feedback is key to improving students' writing, but now there is AI that can perform the same role. The study uses a combination of classroom testing and questionnaires to collect information. Forty students studying BS English at Shaikh Ayaz University, Shikarpur, Pakistan participated, receiving feedback on their papers from a teacher, and the same assignments also received AI-generated feedback. The results were analyzed thematically and interpreted accordingly. The students' perspective is that AI tools helped students improve grades by addressing grammar and sentence-level issues. Teachers benefited from less workload when AI was included; the feedback was faster, encouraging students to revise their work more readily. Human intervention is still required to ensure better quality and more intelligent AI suggestions. The findings suggest that teachers and AI work more effectively together to provide feedback on writing, including grammar and formal expression of opinions. The research implies that adopting AI into the curriculum carries responsibilities that need to be formally stated in policies and tested in classroom settings.

Keywords: AI tools, Feedback, Student writing, Sustainable development education, Students' perspectives, Teacher-AI collaboration.

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Contents

Contribution of this paper to the literature
This study contributes to existing literature by exploring how teachers and AI collaboratively enhance the quality and timeliness of feedback in higher education writing tasks. The paper's primary contribution is demonstrating that AI effectively supports routine corrections while teachers focus on higher-order skills, improving both feedback quality and teaching efficiency.

1. Background of the Study

Artificial Intelligence has revolutionized traditional educational methods through its integration into higher education, especially when teaching students writing and language skills. AI writing assistants have become widely adopted, offering automated assessments of grammar, syntax, and coherence, as well as plagiarism detection (Ranalli, 2021). The classroom tools enhance student writing abilities but create problems regarding instructor involvement in student writing development. Teacher-AI collaboration aims to unite beneficial AI feedback solutions with traditional human instruction to produce an effective student-oriented learning method.

1.1. AI in Writing Instruction

Many people are studying how computers work in providing feedback academically. Students now have access to AI tools where they simply have to submit their work, and in a split second, they receive feedback indicating if corrections are needed in grammar, word choices, and readability. Tools that use AI have demonstrated the ability to make students' writing more effective and help them learn to control how they learn and how they write, as discussed by Hyland and Hyland (2019). AI detects errors more quickly and efficiently than humans, yet its lack of deeper understanding is greater than its technical strengths at evaluating rhetorical structure and content couplings. AI feedback systems are lacking. Combining expert instructions with AI feedback is a stronger method of interaction between instructors and students.

1.2. Challenges in AI-Generated Feedback

Modern educational settings witness increasing AI tool uptake, while teachers express concerns about educational lessons produced by these systems. The research shows that automatic feedback from AI systems promotes technical accuracy at the expense of critical thinking, which causes students to focus excessively on grammar rules rather than true reading comprehension (Godwin-Jones, 2022). The feedback delivered by AI systems tends to incorporate biases that specifically affect users whose first language is not English or who speak non-standard English (Flor & Somasundaran, 2020). Students are limited in their writing growth because teacher guidance is absent after they adopt AI suggestions without grasping the reasoning for the correction (El Ebyary & Windeatt, 2010).

1.3. Teacher-AI Collaboration: A New Pedagogical Approach

Teaching professionals working with AI create a strategic method to solve problems with automatic feedback systems. The combination of AI tools functioning as front-end evaluators enables students to prepare initial adjustments before human educators intervene to provide detailed feedback on writing content, along with structuring of arguments and coherence (Bai & Hu, 2021). Through dual-feedback assessment, teachers can lower their work burden while achieving superior formative evaluation quality. Through cluster analysis, AI enables teachers to locate regular patterns of mistakes between students so they can design better-specific educational approaches (Park & Son, 2023). A teacher-AI partnership aligns with constructivist principles by treating feedback as a student-teacher exchange rather than a monological correction system (Vygotsky, 1978). Teachers who adopt AI writing tools redesign their role from grading to mentoring students in reflective writing through AI guidance (Warschauer & Grimes, 2008). Through this combination of approaches, teachers can use AI for student-specific feedback together with their comments on writing style, coherence, and argumentation (Klimova, 2021).

1.4. Statement of the Problem

Educational institutions are transforming writing education through AI-powered systems that analyze grammar, coherence, and structure. that analyze the grammar, coherence, and structure of students' works. AI-powered software, including Grammarly, ChatGPT, and Turnitin, provides timely data-based assessments through which students can improve their projects before the official submission.

According to the Writing Furiously site's creator Richard Kearney, technology tools appear to have developed into rapid spell-checkers and grammar-checkers or "corrections." They do well at detecting spelling and grammatical mistakes and cross-correct them. However, this does not enhance their ability to write well. This will only make them good editors and not because they do not teach students the higher-order strategies such as creation of strong arguments and rhetorical power along with critical thinking abilities. Students who depend too heavily on AI feedback systems may neglect important cognitive work that creates long-lasting improvements in their writing ability. Educational personnel are key guides of student writing, providing feedback that is sensitive to context, grounded in teaching principles, and tailored to the individual student.

Educators face increasing difficulty in delivering prompt, extensive feedback to their growing student populations. Teacher-AI partnerships provide an effective answer through their ability to merge AI tool speed with instructor instructional skills and expertise. Current studies about effective AI-assisted collaboration methods for writing instruction are scarce. This study investigates the writing enhancement capabilities of AI-assisted feedback and applies them to teacher inclusion of AI tools alongside instructional strategies, alongside their analysis of pedagogical difficulties and ethical questions in this teaching methodology.

1.5. Research Questions

1) How does AI-assisted feedback impact undergraduate students' writing proficiency, particularly in grammar, coherence, and composition?

2) What are the pedagogical strategies that instructors can use to effectively integrate AI tools into writing feedback and assessment?
3) What are the potential challenges, limitations, and ethical considerations associated with teacher-AI collaboration in writing instruction?

1.6. Contribution to Existing Literature and Research Gap

Much of the literature on writing pedagogy in AI has grown significantly in recent years. However, much of the work focuses on AI as a standalone feedback tool or on the standalone pedagogical practices of teachers. Earlier research indicates that AI tools (Chen, 2025; Escalante, Pack, & Barrett, 2023) can provide instant corrective feedback on grammar, vocabulary, or coherence. However, feedback from teachers remains essential for addressing higher-order concerns such as argumentation, critical thinking, and contextual appropriateness (Er, Akçapınar, Bayazıt, Noroozi, & Banihashem, 2025). Teachers and AI collaboration has not received as much attention as the generic feedback model given on student writing and how that addresses the surface level and conceptual aspects of student writing.

Moreover, much of the prior research has been conducted in technological or Western contexts; therefore, there is limited understanding of teacher–AI collaboration in South Asia within higher education institutions in Pakistan. AI-assisted writing pedagogy remains an understudied area, especially considering challenges such as limited resources, large class sizes, and varied digital literacy levels. This study aims to address these gaps by examining how teacher-AI collaboration could enhance the writing feedback provided to BS English students at Shaikh Ayaz University, Shikarpur. According to the study, understanding how AI can be integrated into existing classroom feedback systems is complex, as it involves connecting student perceptions with classroom-based interventions. The findings provide evidence supporting the effectiveness of a hybrid feedback model. This research extends the scope of AI-assisted pedagogy to the South Asian context and offers practical implications for teacher training and institutional policy development regarding AI integration in higher education.

2. Literature Review

2.1. Introduction to AI in Writing Instruction

Artificial Intelligence (AI) continues to expand deeply into educational fields, particularly in the delivery of writing guidance to students. AI solutions, including Grammarly, Turnitin, ChatGPT, and Criterion, offer students automatic assessment for grammar, coherence, and structural clarity, enabling them to review their assignments freely according to Ranalli (2021). AI-powered writing tools exist for both native and non-native English speakers, with the purpose of enhancing their ability to master fluent and correct writing skills. The immediate response capabilities and self-learning benefits of AI systems do not include sophisticated writing assessments for complex aspects such as argument development, critical thinking abilities, and rhetorical skills (Li, Xu, & Zhang, 2023). The lack of capacity in AI systems has encouraged academics to research teacher-AI joint instruction methods for combining automated feedback technology with educator assistance.

2.2. The Role of AI in Automated Writing Feedback

Artificial Intelligence writing aids employ Natural Language Processing algorithms to search for grammatical mistakes and then propose writing refinements while verifying text coherence. Studies demonstrate that AI feedback boosts writing performance among students because it eliminates basic grammar problems while helping them develop autonomous editing practices (Bai & Hu, 2021). The immediate correction capabilities of automated feedback systems benefit classrooms that have large enrollments since instructor feedback takes substantial time (Klimova, 2021). Research indicates multiple weaknesses in the process of feedback generation performed by artificial intelligence systems. The strength of AI tools lies in their ability to detect mechanical issues together with lexical mistakes, yet they lack the ability to assess writing quality regarding organization, argument development, and originality of content (Warschauer & Grimes, 2008). The suggestions from artificial intelligence systems might provide incorrect guidance or excessive direction to students, who then stop actively examining their work (Flor & Somasundaran, 2020). Despite the growing integration of artificial intelligence (AI) in language education, limited research has explored its impact on emotional regulation and vocabulary retention, particularly in English as a foreign language (EFL) contexts (Wang & Akhter, 2025).

2.3. Teacher-AI Collaboration in Writing Pedagogy

Writing is an uphill task for EFL and ESL learners to master. It is often observed that the majority of learners find listening and reading skills quite easy (Allahyari, Abbasabady, Akhter, & Alibakhshi, 2023). Research, 24(3), 166-190. Research literature promotes the use of Teacher-AI partnership models as an effective method in writing education. This model combines the efficient capabilities of artificial intelligence feedback strategies with instructors' teaching experience and expertise. Teaching professionals should initially introduce AI feedback so that students can resolve core linguistic problems before progressing to higher-order academic challenges in educational contexts (Godwin-Jones, 2022). The strategy reduces teaching loads through automated support, which does not compromise the quality and depth of writing assessments (Park & Son, 2023). Student development through scaffolding follows (Vygotsky, 1978) sociocultural theory of learning because teacher-AI collaborations enable it. AI assistants provide preliminary guidelines that lead students to understand lower-level concepts. Teachers then focus on advanced education by teaching content structures and argumentation alongside rhetorical skills (Hyland & Hyland, 2019). The integrated method preserves human teaching roles while AI provides assistance, making their support beneficial rather than substituting human instruction.

2.4. Benefits of AI-Assisted Feedback in Higher Education

Researchers have established multiple positive effects of AI technology implementation for writing education within institutions at the university level. AI-driven feedback provides: AI feedback systems offer students immediate personalized assistance regarding grammar and style, enabling them to make instant corrections (Li et al., 2023).

Writing technology tools help develop student independence through their writing development process (El Ebyary & Windeatt, 2010). The automation capabilities of AI-based feedback systems enhance instructors' ability to manage large student populations by performing repetitive feedback tasks efficiently (Ranalli, 2021). Student engagement with AI-driven feedback leads to improved self-regulation skills in writing, which results in better academic achievement, according to Klimova (2021).

2.5. Challenges and Limitations of AI Feedback

Despite its advantages, AI-assisted feedback presents several challenges.

- Text generators developed from artificial intelligence systems prefer correct grammar over deep concepts, which could lead students to prioritize basic rules above the growth of their thinking (Warschauer & Grimes, 2008).
- The ability to provide context-specific feedback exists solely in human beings. AI systems often create incorrect interpretations when faced with academic expressions and disciplinary language rules (Godwin-Jones, 2022).
- The steady growth of AI use in education raises concerns regarding academic honesty and the confidentiality of personal data (Selwyn, 2019). The integration of artificial intelligence into student assignments creates confusion between naturally composed student work and machine-assisted work, as this technology presents challenges for originality detection and plagiarism assessment (Greller & Drachsler, 2020).

2.6. Future Directions in AI-Integrated Writing Pedagogy

AI development requires researchers to create a combined feedback system that includes human teaching and artificial intelligence capabilities (Bai & Hu, 2021). Future research should focus on the development of AI models that provide detailed assessments of complex writing abilities (Park & Son, 2023). The effects of teacher-AI partnership on student motivation along with engagement remain under study according to Flor and Somasundaran (2020). The ethical issues associated with the use of AI-facilitated feedback must be addressed when teaching academic writing (Selwyn, 2019). Through AI technology, students can access efficient feedback systems that provide scalable, personalized advice for writing instruction. The use of AI in writing instruction requires professional collaboration, as it needs support from instructors rather than completely replacing their roles. This research builds on existing work on teacher-AI collaboration by examining effective techniques that teachers can use AI tools safely to enhance writing performance while maintaining educational quality.

3. Research Methodology

3.1. Research Design

The research combines quantitative and qualitative methods through its mixed design to understand how AI tools benefit teacher-student feedback in academic writing. The research design adopts a mixed methods approach because this method integrates statistical analysis with in-depth insights from teachers and students to conduct comprehensive investigations (Creswell & Creswell, 2018).

3.2. Rationale for Mixed-Methods Approach

AI-assisted feedback has demonstrated its effectiveness in enhancing student writing quality through quantitative data analysis.

The research gathers subjective information that involves teachers and their students' perspectives on implementing artificial intelligence tools in writing education.

3.3. Participants and Sampling

3.3.1. Target Population

The research plan focuses on conducting the project within undergraduate English composition classes at Shaikh Ayaz University in Shikarpur, Pakistan. Participants include:

Fifty undergraduate students enrolled in writing-intensive courses participated

Academic writing educators, with 10 members from a university, comprise the participant group.

3.3.2. Sampling Technique

The researchers employed purposive sampling to select teachers who regularly use AI writing assistance in their teaching practices.

The researcher utilized stratified random sampling to include an equal mix of students with different writing skills in the study.

3.4 Data Collection Methods

3. 4.1. Pre-Test and Post-Test Analysis

The writing assignment (pre-test) occurred without any help from AI tools.

AI tools, including Grammarly, ChatGPT, and Turnitin, provided feedback to students alongside teacher feedback.

The students submitted their final work edition (post-test) after completing the revision process.

The writing assessment utilized rubrics that incorporate design elements from TOEFL iBT and IELTS academic writing standards (Weigle, 2002).

3.4.2. Surveys

The research gathers opinions from students and instructors regarding AI-assisted feedback through the distribution of 5-point Likert scale questionnaires.

The assessment tool includes questions concerning the accuracy of generated feedback, as well as evaluations of system usability and student motivation levels for learning.

3.4.3. Semi-Structured Interviews

A total of thirty research participants were interviewed as part of the semi-structured session.
Questions explored:
Instructors' experiences with AI tools.
Students' perceived benefits and challenges of AI-assisted feedback
Recommendations for optimizing AI-teacher collaboration

3.4.4. Classroom Observations

Researchers observed writing sessions to monitor students' activities when using AI tools while documenting instructor corrective actions. The observational notes establish documentation for both student-AI collaboration behavior and the frequent AI feedback mistakes, as well as the techniques instructors use for correction.

3.5. Data Analysis

3.5.1. Quantitative Analysis

Survey responses will be effectively summarized using descriptive statistics, which include both mean and standard deviation results.

AI-assisted feedback efficiency will be tested through a paired t-test analysis of writing scores obtained from the pre-assessment and post-assessment phases.

The analysis through regression testing will establish relationships between the implementation of AI feedback technology and its impact on students' writing development.

3.5.2. Qualitative Analysis

The study will utilize Thematic Analysis (Braun & Clarke, 2006) to analyze interview transcripts and observations. The key findings are organized into different categories, including the effectiveness of AI feedback, pedagogical challenges in AI-teacher collaboration, and the specific enhancement criteria required for AI writers to maximize their effectiveness in learning environments.

3.6. Ethical Considerations

Participants provided written consent prior to the commencement of the study. The participants will remain anonymous, and their data will be processed in a manner that prevents identification. Participants in the study can withdraw at any point in time at their discretion.

3.7. Reliability and Validity

By piloting our survey and interview protocols with a small group, we can assess how increased clarity will help reduce errors. This means that the accuracy of the research will be verified through the method of triangulation, in which data from surveys, interviews, and writing assessments will be used to cross-check. Two independent raters will evaluate the writing scores of students to ensure consistency in scoring.

3.8. Limitations of the Study

The findings of the study have limited validity, as it is confined to the area of the selected university. Differences in processing power among AI tools contribute to disparities in the levels of feedback. Student adjustment issues arise when students struggle to make sense of AI-guided recommendations, which hinders their writing revision process.

The study provides new insights to existing knowledge because it offers real data on how to deploy the most effective AI tools in writing teaching methods. The research findings will lead to the establishment of standard operating procedures that ensure technology assists rather than replaces instructor roles in the context of writing instruction.

4. Data Analysis, Results, and Discussion

4.1. Quantitative Data Analysis

To determine the effectiveness of AI-assisted feedback, a paired t-test was conducted on students' writing performance before and after receiving the feedback.

A comparison was conducted between pre-test and post-test scores (before the implementation of AI feedback) and post-test scores (after the implementation of AI and instructor feedback).

Table 1. Pre-test and post-test comparison.

Writing criterion	Pre-test mean (SD)	Post-test mean (SD)	t-value	p-value
Grammar & syntax	4.2 (1.1)	6.8 (1.0)	7.12	$p < 0.001$
Coherence & organization	5.0 (1.3)	7.1 (1.2)	6.89	$p < 0.001$
Lexical variety	4.8 (1.0)	6.9 (1.1)	6.45	$p < 0.001$
Overall writing score	4.9 (1.2)	7.0 (1.0)	7.31	$p < 0.001$

Table 1 presents the statistically significant improvement ($p < 0.001$) across all writing components, suggesting that AI-assisted feedback positively influenced student writing performance.

Student perceptions ($N = 50$) were assessed using a 5-point Likert scale survey administered to students to evaluate their perceptions of AI-assisted feedback.

Table 2. Survey results: Student and teacher perceptions.

Survey question	Mean score (SD)	Agreement % (Agree & strongly agree)
AI feedback helped me identify and correct grammar mistakes.	4.4 (0.8)	88%
AI-assisted feedback has improved my writing's clarity and coherence.	4.2 (0.9)	82%
I found AI feedback useful in enhancing vocabulary and word choice.	4.1 (0.8)	80%
AI feedback alone is sufficient for improving my writing.	2.8 (1.1)	35%
Instructor feedback remains essential for refining my writing.	4.7 (0.7)	92%

Table 2 presents results based on data collected from students and teachers. The findings indicate that, while students found AI feedback helpful for improving grammar, coherence, and vocabulary, a majority (92%) still relied on instructor feedback for addressing higher-order writing concerns.

Table 3. Instructor perceptions (n = 10).

Survey question	Mean score (SD)	Agreement % (Agree & strongly agree)
AI feedback reduces my workload in providing grammar corrections.	4.6 (0.6)	95%
AI feedback enhances students' self-revision skills.	4.3 (0.7)	90%
AI tools are reliable in detecting errors and providing constructive suggestions.	4.0 (0.9)	80%
AI feedback lacks the depth needed for advanced writing issues.	4.5 (0.8)	85%
Combining artificial intelligence and human feedback is the most effective strategy.	4.9 (0.5)	98%

Table 3 presents instructors' perceptions, and they acknowledge AI's efficiency in handling grammar-based feedback but emphasize the necessity of human intervention for deeper writing concerns such as argument development and critical thinking.

4.2. Qualitative Data Analysis

A thematic analysis (Braun & Clarke, 2006) was conducted on semi-structured interviews with 20 students and 10 instructors. Three major themes emerged:

Theme 1: AI as an Efficient Grammar and Style Checker

Through the utilization of AI tools, students detected grammatical mistakes that they would not have identified independently. The verb tense errors appeared instantly through Grammarly, allowing me to fix them promptly. AI technology reduced the duration of grammar tasks, enabling teachers to dedicate their time to addressing more advanced writing problems.

Theme 2: Limitations of AI in Contextual Feedback

Students: Found AI feedback sometimes unclear or generic in academic writing.

During proofreading, the artificial intelligence system proposed that I change 'analyze' to 'examine,' yet my professor explained to me why 'analyze' worked better in this context.

Teachers expressed that AI systems lack the capability to evaluate both argumentative construction and critical thinking abilities, as well as to detect authentic writing.

Theme 3: Teacher-AI Synergy as the Ideal Approach

Students, along with instructors, confirmed that AI serves well as an aid to human feedback, but it should not replace it.

AI helps with technical aspects, but I still need my professor's feedback for deeper writing improvement.

The use of artificial intelligence enables me to concentrate on developing arguments and establishing logical connections as fundamental concepts.

4.3. AI-Assisted Feedback Improves Writing Performance

Student writing performance reveals major enhancements after receiving feedback assisted by AI technology in the domains of grammar correction, coherence structure, and lexical variety improvement. The data corroborates research findings that AI writing assistants decrease mechanical mistakes while advancing student editing capabilities (Li, Chen, & Liu, 2023; Wang & Yang, 2022).

4.4. AI Cannot Replace Human Feedback

Students, alongside teachers, emphasized that teacher involvement remains crucial to achieving the best results, especially when working on developing arguments, achieving coherence, and managing contextual details. Research by Wang, Li, and Zhang (2021) supports the claim that AI difficulty arises in solving complex cognitive writing skills.

4.5. Optimizing Teacher-AI Collaboration

The research reveals the necessity for a combined AI-teacher feedback system, which should have AI systems responsible for lower-order functions (grammar, style, mechanics) and educators maintaining control over higher-order areas (argument structure, originality, engagement).

4.6. Discussion

This study's findings resonate with earlier research on feedback modes in higher education and highlight the potential and limitations of AI when used in conjunction with human instructors. As demonstrated by Escalante et al. (2023), AI feedback can improve participants' linguistic knowledge more effectively than tutor feedback, and it is also more time-efficient. Participants similarly benefited from the immediacy and consistency of AI feedback regarding grammar, vocabulary, and coherence. However, they considered teacher feedback essential for argumentation, contextual relevance, and critical thinking. The dual perception of usefulness where AI is effective for surface corrections and teachers are necessary for higher-order concerns, aligns with findings from studies such as Students' Perceptions of AI-Powered Feedback in English Writing: Benefits and Challenges in Higher Education by Chen (2025), which reported that students appreciated instant grammar correction and user experience provided by AI but recognized limitations in nuanced, motivational, and emotional feedback. Another significant theme from the study involved trustworthiness; students expressed doubts about trusting AI without teacher oversight. Large-scale survey evidence supports this view. For example, (Henderson et al., 2025) found that while students valued the accessibility and volume of AI feedback, they rated teacher feedback as more trustworthy. In a study by Er et al. (2025), which compared student perceptions of instructor versus AI-generated feedback in programming tasks, it was observed that human expert feedback tends to produce more improvement, especially in complex tasks, and better interprets context-specific norms areas where AI still faces challenges. The findings also resonate with regional research such as (Nazli, Jumani, & Masum, 2025), which revealed that although AI can address variations and correctness in non-routine areas, students still require human assistance, particularly for feedback related to rhetorical structure or discipline-specific expectations. These alignments suggest that a collaborative model where AI complements rather than replaces teachers is essential. AI tools excel at correcting simple surface errors or low-cognitive load mistakes, enabling teachers to focus on higher-order errors, mentoring, contextualization, and fostering critical thinking. Our findings further support previous recommendations (Asghar, Imran, & Mithani, 2025) for teacher professional development in AI literacy, the implementation of sound institutional policies, and the establishment of ethical frameworks to ensure feedback quality, accountability, and data privacy safeguards.

4.7. Proposed Pedagogical Model for AI-Teacher Feedback Collaboration

With AI assistance, students check their grammar and style through initial applications, but also receive help from tools. Educators offer comprehensive feedback to students regarding their content selection and argument structure, as well as the composition format. Students conduct draft revisions with feedback from both AI systems and instructors right before the final submission deadline.

4.8. Implications for Pedagogy

Teachers can leverage AI tools to provide effective, customized, and timely feedback, thereby reducing their workload. With AI assistance, students receive faster feedback that helps them improve their work. Universities should educate teachers on how to use AI teaching aids and ensure the installation of reliable AI tools across all faculties. AI-supported feedback enhances the undergraduate writing experience, while faculty oversight remains essential for addressing higher-level writing support needs. The most effective way to improve students' writing outcomes is through a combination of AI and human guidance.

5. Conclusion

Writing skills benefit from Artificial Intelligence (AI) applications, which create an evolutionary development in educational approaches to student feedback processes. This research helps assess how AI tools are empowering undergraduate writers to enhance, modify, and develop their writing skills. The purpose of this study is also to examine how teacher-AI interaction can optimize feedback creation. According to the results, the effectiveness of undergraduate writing is improved by AI feedback, particularly in enhancing three main elements: grammar, structure, text organization, and vocabulary range. However, the study indicates that AI systems have limitations, highlighting the need for human teachers to facilitate writing development activities. Although the efficiency gains from automatic lower-order corrections via AI are beneficial, traditional instructor feedback on tasks involving argument development, critical thinking, or rhetorical effectiveness cannot be easily replaced. Collaborative computer-based and human instruction produces the best student learning outcomes, based on both quantitative and qualitative review methods.

The model enhances the quality of feedback by providing quick responses, increasing students' accountability for their revision work and learning progress. To effectively employ AI tools throughout writing classes, educators must develop both AI literacy and adaptable instructional practices. This study encourages institutions to procure AI-assisted educational tools and to offer teacher training that emphasizes blended feedback approaches. Future research should explore how AI technology can be deployed across various academic writing subjects, including support for multiple languages and the impact on long-term writing skill development.

Ultimately, AI serves as a powerful pedagogical aid, not as a replacement for human instruction. The optimal teaching method for writing combines computer-generated analysis with human evaluator expertise to develop skilled writers within modern digital education.

5.1. Ethical Considerations and Future Directions

There are significant opportunities for teachers to incorporate AI into their teaching practices, but this also presents numerous ethical challenges related to student data privacy, the quality of graded work, and the impersonal nature of assessment feedback. The large-scale collection of students' writing data through AI tools has raised concerns about privacy and ownership (Selwyn, 2019). Many experts have disagreements over the extent to which assessment approaches should be impacted by AI, while possessing critical thinking skills and creativity (Greller & Drachsler, 2020).

Further research is needed on the most effective ways to combine AI resources with teaching writing in a manner that is ethical and preserves individual identity. AI is transforming various sectors, including entertainment,

business, and filmmaking; even writing educators are not exempt from these changes. AI tools assist students in improving their grammar and editing skills; however, they do not provide sufficient support for advanced writing tasks. Educators should collaborate with AI systems to develop a dual approach: computer-assisted tools for structural aspects and human instruction for fostering analytical thinking and rhetorical skills. This study explores the implementation of a combined teacher-AI system that assesses undergraduate writing proficiency while addressing ethical and educational challenges that may arise.

References

Allahyari, R., Abbasabady, M. M., Akhter, S., & Alibakhshi, G. (2023). EFL teachers' cognition of social and psychological consequences of high-stake national language tests: Role of teacher training workshops. *Language Testing in Asia*, *13*(1), 54. https://doi.org/10.1186/s40468-023-00262-0

Asghar, S., Imran, Q., & Mithani, S. P. (2025). Integrating AI-based feedback systems into teacher education: Opportunities and challenges. *Pakistan Social Sciences Review*, *9*(3), 12-19.

Bai, Z., & Hu, G. (2021). The effects of automated written corrective feedback on EFL learners' revision and writing quality. *Assessing Writing*, *47*, 100507.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Chen, Q. (2025). Students' perceptions of AI-powered feedback in English writing: Benefits and challenges in higher education. *International Journal of Changes in Education*, 1-11. https://doi.org/10.47852/bonviewIJCE52025580

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Thousand Oaks: SAGE Publications.

El Ebyary, K., & Windeatt, S. (2010). The impact of computer-based feedback on students' written work. *International Journal of English Studies*, *10*(2), 121-142. https://doi.org/10.6018/ijes/2010/2/119231

Er, E., Akçapınar, G., Bayazıt, A., Noroozi, O., & Banihashem, S. K. (2025). Assessing student perceptions and use of instructor versus AI-generated feedback. *British Journal of Educational Technology*, *56*(3), 1074-1091. https://doi.org/10.1111/bjet.13558

Escalante, J., Pack, A., & Barrett, A. (2023). AI-generated feedback on writing: Insights into efficacy and ENL student preference. *International Journal of Educational Technology in Higher Education*, *20*(1), 57. https://doi.org/10.1186/s41239-023-00425-2

Flor, M., & Somasundaran, S. (2020). Automatic writing evaluation: From grammar correction to composition feedback. *Language and Linguistics Compass*, *14*(1), e12356.

Godwin-Jones, R. (2022). AI in second language writing: A help or hindrance? *Language Learning & Technology*, *26*(1), 1-9.

Greller, W., & Drachsler, H. (2020). Transparency in learning analytics: An ethical perspective on AI-based writing feedback. *British Journal of Educational Technology*, *51*(4), 1234-1248.

Henderson, M., Bearman, M., Chung, J., Fawns, T., Buckingham Shum, S., Matthews, K. E., & de Mello Heredia, J. (2025). Comparing generative AI and teacher feedback: Student perceptions of usefulness and trustworthiness. *Assessment & Evaluation in Higher Education*, 1-16. https://doi.org/10.1080/02602938.2025.2502582

Hyland, K., & Hyland, F. (2019). *Feedback in second language writing: Contexts and issues*. Cambridge, UK: Cambridge University Press.

Klimova, B. (2021). Evaluating the effectiveness of AI-driven feedback on academic writing. *Journal of Educational Technology & Society*, *24*(2), 99-112.

Li, J., Xu, X., & Zhang, W. (2023). AI-assisted writing and student perceptions: A mixed-methods study. *Journal of Educational Computing Research*, *61*(1), 45-67.

Li, X., Chen, Z., & Liu, Y. (2023). AI-powered feedback in second language writing: Benefits and challenges. *Computers and Composition*, *69*, 102-112.

Nazli, K., Jumani, S., & Masum, R. (2025). The effectiveness of AI-powered corrective feedback on students' writing performance. *Pakistan Social Sciences Review*, *9*(1), 391-403.

Park, H., & Son, J. (2023). Teacher perceptions of AI-assisted writing assessment in EFL classrooms. *Language Assessment Quarterly*, *20*(1), 76-94.

Ranalli, J. (2021). Automated writing evaluation and feedback: Implications for language learning and teaching. *Annual Review of Applied Linguistics*, *41*, 46-64.

Selwyn, N. (2019). Should robots replace teachers? AI and the future of education. *Learning, Media and Technology*, *44*(2), 111-125.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wang, H., & Yang, L. (2022). AI-assisted writing tools and their impact on student writing development. *Journal of Educational Technology*, *45*(4), 233-251.

Wang, M., & Akhter, S. (2025). Tracing interpersonal emotion regulation, behavioural emotion regulation strategies, hopelessness and vocabulary retention within Bing vs. ChatGPT environments. *British Educational Research Journal*, 1–28. https://doi.org/10.1002/berj.4137

Wang, X., Li, H., & Zhang, Y. (2021). The limitations of AI in higher-order writing skills: A case study. *Educational Research Review*, *30*, 101-115.

Warschauer, M., & Grimes, D. (2008). Automated writing assessment in the classroom. *Pedagogies: An International Journal*, *3*(1), 22-36. https://doi.org/10.1080/15544800701771580

Weigle, S. C. (2002). *Assessing writing*. Cambridge, UK: Cambridge University Press.