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EXAMINING WRITING FEEDBACK DYNAMICS FROM CHATGPT AI AND HUMAN EDUCATORS: A COMPARATIVE STUDY

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Abstract. As technology increasingly influences educational practices, it is crucial to comprehend the impact and effectiveness of AI in comparison to human-driven methodologies. In the field of language learning and writing instruction, one notable development is the emergence of AI-generated writing feedback tools. These tools, exemplified by ChatGPT in this study, promise efficiency, objectivity, and detailed insights for learners. This study aims to investigate the comparative effectiveness of an artificial intelligence (AI) automated writing feedback tool and human teacher feedback in enhancing the writing skills of English Language Learners. The research was conducted on fifteen third-year undergraduate students in the discipline of English Language Education, using a phenomenological design. The study collected qualitative data through assignments and feedback given to students at a higher education institution. The findings suggest that while human teachers were praised for their understanding, personalized guidance, and emotional intelligence in providing feedback, AI-generated feedback was considered more detailed and comprehensive. It highlights the importance of balancing efficiency with the human touch in the feedback process. This study makes a significant contribution to the ongoing discourse surrounding the integration of AI in education and its impact on the student-teacher dynamic.

Keywords: AI writing feedback; Al vs human teacher; ChatGPT writing; artificial intelligence and writing

1. Introduction

The use of AI in education presents both exciting opportunities and challenges. Automated writing feedback systems can provide learners with immediate responses, aiding in the development of writing skills and fostering a more efficient learning process. However, questions persist regarding the capacity of AI models to comprehend the intricacies of language, understand context, and deliver feedback that is not only accurate but also pedagogically effective.

This study explores the comparative dynamics between AI-generated feedback and human teacher feedback. Although AI models can analyze vast datasets and learn patterns from a multitude of writing styles, human teachers possess the unique ability to empathize with the individual needs and nuances of each learner. The qualitative aspects of feedback, such as encouragement, motivation, and personalized guidance, are often considered integral components of the learning experience, and it remains to be seen whether AI can successfully replicate these aspects.

The study evaluates the strengths and limitations of both approaches, shedding light on the efficacy, reliability, and pedagogical implications of AI-generated feedback in the context of writing instruction. By employing a multidimensional assessment framework, encompassing aspects such as content, vocabulary, grammatical accuracy, coherence, clarity, and engagement, this study aims to provide a comprehensive understanding of the comparative dynamics between AI-driven feedback and human teacher feedback.

This research contributes valuable insights to the ongoing discourse on the integration of AI in education by examining sample writings evaluated by both ChatGPT and human teachers. The outcomes of this research may pave the way for designing educational interventions that harness the strengths of both AI and human educators, ensuring a balanced and effective approach to writing pedagogy in the digital age.

2. Theoretical Framework

The underlying theories provide a comprehensive framework for understanding the differences between Artificial Intelligence (AI) and human teacher on writing feedback. The integration of these theoretical perspectives can enhance the design and implementation of feedback mechanisms to optimize the learning experience for individuals seeking to improve their writing skills.

Constructivist Learning Theory

According to Constructivist Learning Theory, learners construct knowledge by building on their existing mental frameworks (Suhendi and Purwarno 2018). Therefore, in the context of writing feedback, it is crucial for learners to engage with feedback that aligns with their current understanding and knowledge.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is a widely-used framework for understanding individuals' acceptance and use of technology. TAM asserts that perceived usefulness and perceived ease of use are key determinants influencing users' attitudes and intentions towards adopting and using a particular technology (Davis 1989). In the context of writing feedback, TAM can be applied to comprehend how users, such as students or writers, perceive and interact with technology-driven feedback systems.

Human-AI Interaction Theory

Human-AI interaction theory asserts that the relationship between individuals and artificial intelligence systems can lead to collaboration, communication, and synergy (Brey and Søraker 2009). In the context of writing feedback, this theory posits that the relationship between students and AI tools can significantly improve the feedback process.

3. Literature Review

The effectiveness of Artificial Intelligence (AI) in writing tools has been extensively researched in education, particularly in terms of its ability to enhance the writing skills of diverse learners. Taşkıran et al. (2024) examined the impact of Automated Feedback (AF) on the writing proficiency of EFL learners in open and distance learning. They found that AF significantly contributed to the development of writing competence, motivation, learning environment, and distance learning.

Liu et al. (2023) proposed an AI-supported English writing approach based on a reflective thinking promotion mechanism, which significantly improved learners' English writing performance, self-efficacy, and self-regulated learning. The approach reduced cognitive load, showcasing the potential of AI in enhancing EFL writing quality.

Bewersdoff et al. (2023) demonstrated the effectiveness of AI in education by developing an AI system based on GPT-3.5 and GPT-4 for error detection in inquiry-based learning. The results indicated that AI system accurately identified fundamental student errors, providing a strong foundation for personalized feedback.

Fawaz (2023) conducted a research on Wordtune's impact on Saudi students' writing, revealing that using Wordtune significantly improved the experimental group's writing, outperforming the control group in the final writing exam.

Shum et al. (2023) analyzed the use of open AF tools by teachers from the perspective of teacher feedback literacy. Their study highlights the importance of teacher feedback competencies, in effectively utilizing open AI tools to enhance teaching practices.

Yang et al. (2023) explored EFL students' interactions with Pigai, the largest AI-programmed AWE in China. Their findings demonstrated a focus on error corrective feedback and provision of rich linguistic resources, albeit without examples and contextual information.

Sun (2023) examined the potential use of generative AI in ESL Writing Assessment, with a specific focus on IELTS Writing Tasks. The researcher analyzed the strengths and weaknesses of generative AI tools and demonstrated how they can assist researchers in writing informative articles more efficiently.

Chen (2022) investigated the feedback and effect of Aim Writing on college students' writing in China. The results suggested that Aim Writing's performance

was inadequate and a hybrid model incorporating both AES and instructor's feedback is necessary.

Wang (2022) examined students' expectations and perceived effectiveness of computer-assisted review tools, revealing high expectations for such tools. Computer scoring feedback was found more effective than teacher scoring feedback, significantly improving students' independent learning ability and English writing skills.

Tonsic (2021) investigated the effect of an AI grammar checker on the pedagogy of high school English teachers. The study found that the use of online grammar checkers prompt critical reflection on assessing Standard English in high schools.

Nazari et al. (2021) demonstrated the effectiveness of Grammarly, an AI-powered writing tool, for English postgraduate students. Their study revealed that Grammarly had a positive impact on cognitive, non-cognitive, and emotional domains. These findings suggest that Grammarly can be a valuable assistive tool for non-native postgraduate students in English academic writing.

Lim and Phua (2019) focused on the effectiveness of a Linguistic Feedback Tool (LiFT) in improving students' English composition. By identifying and providing feedback on language accuracy, LİFT has the potential to reduce teacher marking time.

In summary, the reviewed literature illustrates the diverse applications of AI in writing tools, emphasizing their positive impact on various aspects of writing skills, ranging from cognitive and emotional domains to error detection, personalized feedback, and teacher feedback competencies.

4. Method

This study aimed to examine the effectiveness of an artificial intelligence automated writing feedback tool and human teacher's feedback in enhancing the writing skills of English Language Learners. This study used a phenomenological design, which is a type of qualitative research. In phenomenology, a researcher explores different perceptions of a particular phenomenon. The researcher attempts to identify and describe aspects of each individual's perceptions of their experience in some detail (Fraenkel et al. 2012). The study involved fifteen 3rd year undergraduate students from the Department of English Language Education, comprising of 11 females and 4 males with similar educational background and English language proficiency. The participants were selected on a voluntary basis and were assigned to write a 450 – 500-word essay on a given topic. These assignments were evaluated by ChatGPT, an artificial intelligence writing feedback tool, and a human teacher. The students were then given the reports of evaluation and asked to compare the pros and cons of both evaluation types in terms of content, vocabulary, grammar, cohesion, coherence and overall evaluation.

5. Findings and Results

The final evaluation reports of the students were categorized into themes such as content, vocabulary, grammar, cohesion, coherence and overall evaluation. The researcher selected the most significant responses from the respondents (coded R1 to R15) for each theme and presented them in tables. The data then was interpreted to draw implications for Constructivist Learning Theory, Technology Acceptance Model (TAM) and Human-AI Interaction Theory.

Table 1. Statements Related to the Feedback Under the Theme of Content

R2	In terms of content, the teacher only gave a ‚good' rating, whereas the AI gave the reason why it was good enough in terms of content, being that specific examples or details were provided, the focus was obvious and the expression was clear enough.
R4	Both the AI and the teacher could understand the logic of the content, but the AI gave a more detailed suggestion for revision.
R6	The AI begins by summarizing the points of the article and providing some usable ideas to strengthen your argument.
R14	The AI's feedback summarized the content of my essay in more detail and gave specific suggestions for revision.

Implications for Constructivist Learning Theory under the theme of content

In the context of Constructivist Learning Theory, the AI's feedback aligns with the principles of active engagement and knowledge construction. The focus on specific examples encourages reflective learning and the construction of knowledge regarding effective content. This demonstrates that the AI not only recognizes existing logic but also actively engages the student in the construction of improved content. This aligns with the theory's emphasis on learners actively shaping their understanding. The AI's approach of summarizing key points and providing actionable ideas supports this theory by encouraging students to engage with the material. By summarizing and suggesting improvements, the AI prompts the student to reflect on the content's structure and argumentation, fostering a deeper understanding and construction of knowledge. The feedback provided enables the student to actively engage in revising and developing a more refined understanding of the content.

Implications for Technology Acceptance Model (TAM) under the theme of content

The AI's feedback provides specific reasons for the 'good' rating, contributing to the perceived usefulness of the technology. The detailed insights into the content's strengths enhance the user's understanding of why the content is considered effective, positively influencing the user's attitude towards accepting and utilizing AI-generated feedback. The AI's more detailed suggestions for

revision can significantly impact the perceived usefulness of the technology. The AI's approach to summarizing points and providing usable ideas aligns with TAM by emphasizing the perceived usefulness of the technology. The detailed summary and specific suggestions for revision contribute to the perceived usefulness of the AI.

Implications for Human-AI Interaction Theory under the theme of content

Clear communication enhances the user's understanding and promotes a positive interaction with the AI system. The AI's more detailed suggestions for revision demonstrate a collaborative interaction, where the AI actively engages with the user in content improvement. This aligns the focus of Human-AI Interaction Theory on a cooperative and adaptive relationship between humans and AI systems, fostering a more effective interaction. The AI's approach of summarizing points and providing usable ideas supports a positive and user-centered interaction. The clarity and usefulness of the feedback enhance the user's experience, fostering a dynamic and effective interaction based on mutual understanding and collaboration.

Table 2. Statements Related to the Feedback Under the Theme of Vocabulary

R2	The teacher marked some of the vocabulary and sentences and revised them. the AI also gave very detailed information about the areas of improvement in vocabulary. Here both sides did well.
R4	Both the AI and the teacher gave some nice words to start with and then gave some detailed suggestions on word choice. The teacher's suggestions were even more specific.
R6	AI thought that there was still room for improvement in my word choice, but it presented fewer examples than a real person would, although this problem can be improved by changing the AI's instructions.
R14	The AI gave suggestions for replacement words, while the teacher marked the misspelled words in the text, both of which were clear.

Implications for Constructivist Learning Theory under the theme of vocabulary

This approach encourages active participation by highlighting specific areas for improvement, encouraging a reflective process in which the learner actively considers and internalizes vocabulary improvements. The collaborative effort between the AI and teacher, providing positive words and detailed suggestions on word choice, is line with Constructivist Learning Theory. Learners are actively involved in understanding and refining their language use, building their vocabulary through specific suggestions and examples. Both the AI's suggestion of alternative words and the teacher's marking of misspelled words contribute to a constructivist approach. By focusing on specific language elements, learners are encouraged to actively engage with vocabulary improvement, in line with the theory's emphasis on individualized learning.

Implications for Technology Acceptance Model (TAM) under the theme of vocabulary

The detailed information provided by both the teacher and AI contributes to the perceived usefulness of the feedback systems, supporting TAM principles. Learners are likely to accept and engage with feedback that provides specific information to improve their vocabulary, thereby enhancing their understanding and application. The specific word suggestions from both the AI and the teacher contribute to the perceived usefulness and acceptance of these systems. The collaborative effort to improve vocabulary is consistent with TAM's emphasis on user attitudes and perceived usefulness as determinants of technology acceptance. Both the AI and teacher contributing to vocabulary improvement support perceived usefulness, a key factor in technology acceptance.

Implications for Human-AI Interaction Theory under the theme of vocabulary

The teacher's marking and revising, together with the AI's detailed information, contribute to a positive human-AI interaction. This collaboration ensures that learners receive comprehensive and effective feedback, fostering a positive and beneficial interaction. Both the AI and the teacher providing specific words and detailed suggestions support a positive human-AI interaction. The combination of AI insights and human expertise creates a collaborative environment that enhances the user experience. The AI's recognition of areas for improvement and ability to refine the AI instructions reflect a dynamic and adaptive human-AI interaction. This responsiveness contributes to a more effective and user-friendly interaction. Users receive clear and actionable feedback, promoting an effective collaboration between the human and AI components.

Table 3. Statements Related to the Feedback Under the Theme of Grammar

R4	Both the AI and the teacher gave some suggestions for revision, but the AI's were more detailed.
R5	The underlining of grammar errors in the essay was very detailed, helping me understand my writing issues clearly. This led me to focus only on grammatical errors and ignore other areas where the essay could be improved.
R7	The obvious grammar mistakes were highlighted in teacher feedback, but some of them were not refined. When I noticed them, I thought about what mistakes I had made here, and how I could clarify them to make it more clearly.
R9	Some kinds of errors such as grammar, spelling may be easily and accurately identified by an AI than by a human teacher.

Implications for Constructivist Learning Theory under the theme of grammar

The AI's more detailed suggestions for revision are in line with Constructivist Learning Theory as they encourage active engagement and reflection. The detailed feedback provided to learners offers specific insights, fostering a deeper

understanding of writing principles and prompting them to actively consider and apply improvements. By concentrating on specific aspects, learners actively engage with and internalize corrections, potentially leading to a more targeted improvement in their writing skills. The teacher's identification of grammar mistakes and subsequent reflection could be seen as being in line with Constructivist Learning Theory. This approach encourages learners to actively identify and address errors, promoting a self-directed learning process. The AI's accurate identification of grammar and spelling provides learners with precise feedback.

Implications for Technology Acceptance Model (TAM) under the theme of grammar

Clear and comprehensive feedback can enhance collaboration between the user and the AI, ultimately improving the overall user experience. The AI's more detailed suggestions can contribute to perceived usefulness, which is a key factor in TAM. It is likely that users will accept and engage with technology that provides specific and detailed feedback, enhancing their understanding and facilitating improvement. The detailed underlining of grammar errors by the AI may contribute to perceived usefulness, supporting TAM principles. The teacher's highlighting of obvious grammar mistakes and subsequent reflection may contribute to the perceived usefulness of their teacher's feedback. Users are more likely to accept and engage with feedback that prompts them to reflect on and improve specific areas of their writing. The AI's ability to identify errors aligns with TAM, as it enhances perceived usefulness. Users are likely to accept technology that efficiently identifies and addresses writing errors, contributing to a positive attitude towards the system.

Implications for Human-AI Interaction Theory under the theme of grammar

Providing clear and comprehensive feedback can foster effective collaboration between the user and the AI, ultimately improving the overall user experience. The AI suggestions have the potential to enhance the human-AI interaction. The combination of teacher feedback and user reflection creates a collaborative learning environment.

Table 4. Statements Related to the Feedback Under the Theme of Cohesion and Coherence

R2	In terms of coherence and cohesion, the teacher gave a rating of very good. the AI, on the other hand, pointed out that my essay was coherent, yet I should have used more transitional phrases or sentences to enhance cohesion.
R4	Since the AI didn't know the requirements of my paragraph, it just suggested that I follow the general rules of writing; while the teacher knew that I was asked to write simple paragraphs, he thought my work was OK.

Implications for Constructivist Learning Theory under the theme of Cohesion and Coherence

The AI's suggestion to use more transitional phrases aligns with Constructivist Learning Theory by encouraging active engagement in improving writing skills. The feedback prompts the learner to reflect on the coherence and cohesion of their essay, fostering a deeper understanding of how transitional elements contribute to effective writing. The AI's suggestion to follow general writing rules, despite not knowing specific paragraph requirements, may be consistent with Constructivist Learning Theory. This approach encourages learners to actively explore and apply general writing principles, thereby promoting a more independent and reflective learning process.

Implications for Technology Acceptance Model (TAM) under the theme of Cohesion and Coherence

The AI's specific suggestion for enhancing cohesion contributes to perceived usefulness, a key factor in TAM. Users are likely to accept technology that provides actionable insights for improvement, enhancing their understanding of writing principles. The AI's suggestion to follow general writing rules may contribute to perceived usefulness by providing general guidance.

Implications for Human-AI Interaction Theory under the theme of Cohesion and Coherence

The AI's specific suggestion to improve cohesion contributes to a positive human-AI interaction. Clear feedback on the need for transitional elements encourages effective collaboration between the user and the AI, improving the overall learning experience. The AI's suggestion to follow general writing rules can influence the human-AI interaction.

Table 5. Statements Related to the Feedback Under the Theme of Overall Evaluation

R2	Manual modification is not as efficient as AI, and capturing details and providing modification methods is not as comprehensive as AI.
R3	The teacher, being directly involved in our learning process, has a comprehensive understanding of our individual capabilities. They are aware of our strengths, weaknesses, and areas that require improvement. This personalized feedback is invaluable as it is tailored to our unique learning journey.
R4	Personally, the human feedback can better adapt to the different real-life situations shared by the teacher and the students, while the AI feedback is more detailed in terms of language skills. So from the perspective of improving language skills, AI feedback seems to be more helpful.
R5	In comparison, the AI's feedback was very thorough, covering a comprehensive evaluation of various aspects of writing. But it's important to note that, although the AI's feedback included some examples, specific errors were not mentioned directly.

R7	AI feedback, I think it is more detailed. Each part of the comment will post an example for readers to comprehend.
R8	AI feedback will be better and more complete than the teacher‘s handwritten feedback. Even though both the manual feedback and the AI‘s feedback evaluate the essay in each of the four different elements, the AI‘s evaluation is more detailed. AI feedback may be more objective than human feedback.
R9	In my opinion, feedback from AI is better than feedback from human teachers in this case, the AI‘s feedback is more detailed than the human teacher‘s feedback and provides some feasible ideas for improvement. Secondly, AI‘s feedback is more objective and comprehensive than human teachers‘ feedback.
R10	The feedback given by the AI is more organized, with different summaries for each point, providing both the good and the bad points, as well as giving changes to the sentences that it thinks need to be changed.
R11	The AI evaluation seems to be more specific and more personalized. This personalized feedback can be immensely helpful for me as it highlights specific areas that need improvement, helping me to understand my mistakes and make targeted revisions.
R12	The feedback given by teachers is more intuitive and general, and the feedback from the AI is more detailed and varied.
R13	The difference between the teacher’s feedback on the paper and AI’s feedback is that the teacher’s feedback is more concise and provides a grade, while the AI further gives suggestions for revision. To sum up, the teacher’s feedback in English writing is still necessary because it is more comprehensive, and AI can be used a complementary part.
R14	Overall, the AI‘s feedback was more objective, while the human feedback was more subjective. In addition, the AI‘s feedback was more detailed and gave suggestions for corrections, whereas the manual feedback was briefer. However, the manual feedback reflects the teacher‘s degree of affirmation of the homework and can encourage students to complete the homework better. Therefore, I think it is better to evaluate our assignments with both the teacher‘s and the AI’s comments.
R15	AI feedback can‘t provide the emotional support or more in-depth guidance like a teacher can, but it has many advantages. AI feedback is more detailed, comprehensive and objective.

Implications for Constructivist Learning Theory under the theme of Overall Evaluation

The focus on capturing detail and providing comprehensive correction methods reflects an active learning process that encourages learners to engage with and understand the intricacies of writing improvement. The teacher’s direct involvement in the learning process, understanding of individual abilities, and personalized feedback supports Constructivist Learning Theory. This approach encourages learners to actively reflect on their strengths, weaknesses, and areas for improvement, promoting a personalized and dynamic learning journey. The recognition that human feedback is more adaptable to real-life situations is consistent with Constructivist Learning Theory. This suggests that human feedback to adapt to different learning contexts, fostering a dynamic and contextually relevant learning environment.

Implications for Technology Acceptance Model (TAM) under the theme of Overall Evaluation

The thoroughness of AI feedback, covering various aspects of writing, supports perceived usefulness, a key factor in TAM. The detailed nature of AI feedback, including examples for better understanding, contributes to perceived usefulness, supporting the principles of TAM. This suggests that the detailed feedback provided by AI is likely to be accepted and appreciated by users. The perception that AI feedback is more objective is consistent with TAM, as users are likely to accept technology that provides objective and detailed evaluations. The perception that AI provides more detailed feedback may positively influence users' attitudes towards the technology. The preference for AI feedback due to its detail, objectivity, and comprehensiveness is in line with TAM principles. Users are more likely to accept technology that provides detailed and objective feedback, contributing to positive attitudes and perceptions of usefulness. The organized nature of AI feedback, with different summaries for each item, supports TAM by increasing the perceived usefulness of the technology. The systematic presentation of feedback contributes to a positive user experience.

Implications for Human-AI Interaction Theory under the theme of Overall Evaluation

The perception that AI assessment is more specific and personalized supports a positive human-AI interaction. Clear and personalized feedback promotes an effective collaboration between the user and the AI, contributing to a positive user experience. The perception that AI feedback is more detailed and varied is consistent with a positive human-AI interaction. This variety contributes to a dynamic and engaging interaction, improving the overall user experience. Recognizing that teacher feedback is more concise and provides a grade, while AI provides suggestions for revision, supports a collaborative human-AI interaction. This recognizes the complementary roles of both the teacher and AI in providing comprehensive feedback. The recognition that AI feedback is more objective and detailed, while human feedback reflects affirmation and encouragement, suggests a harmonious human-AI interaction. The combination of objective AI assessments and human encouragement contributes to a positive and balanced learning environment. Recognizing that AI feedback lacks emotional support but has advantages in detail, comprehensiveness, and objectivity supports a nuanced human-AI interaction. This recognition of the strengths and limitations of both human and AI feedback contributes to an informed and balanced approach.

6. Discussion

This study analyzed the efficacy of artificial intelligence automated writing feedback tools in comparison to human teacher's feedback for enhancing the writing skills of English Language Learners. This was a comparative study and the

outcomes of two feedback types were compared and discussed based on learners' writing assignments. This discussion was centered around key findings from recent academic articles, exploring the implications for various learning theories, technology acceptance, and human-AI interaction.

The study's findings supported Taşkıran et al. (2024) emphasis on the positive impact of AF on writing competence, motivation and the learning environment. Their findings emphasized AF's positive impact on writing competence, motivation, and the learning environment. These results were in line with Constructivist Learning Theory, which highlights the importance of active engagement and knowledge construction. The clear communication and detailed suggestions facilitate a collaborative and effective interaction between learners and AI systems. Similarly, Liu et al. (2023) proposed an AI-supported English writing approach, based on reflective teaching mechanisms, resulting in significant improvements in learners' writing performance, self-efficacy, and self-regulated learning. These findings were consistent with the present study, which highlighted the importance of Constructivist Learning Theory in emphasizing learners' active participation in shaping their understanding. Both studies demonstrated the positive impact of AI-supported writing tools on self-efficacy and self-regulated learning. Learners were likely to accept and engage with these tools due to the AI's role in reducing cognitive load and enhancing self-regulated learning. This fosters a cooperative and adaptive relationship between learners and AI systems, resulting in a more effective interaction.

The results of Bewersdoff et al. (2023) identified fundamental student errors, providing a basis for personalized feedback. This finding was consistent with the present study and Constructivist Learning Theory as the AI can pinpoint learners'errors in improving their writing skills. In terms of TAM, the accurate identification of errors contributed to the perceived usefulness of the AI system. The AI's precise error identification fostered a positive and effective interaction, aligning with Human-AI Interaction Theory. Furthermore, Fawaz (2023) investigated Wordtune's impact on students' writing and revealed significant improvements in the experimental group's writing compared to the control group. This finding was consistent with Constructivist Learning Theory and the present study's result, which highlighted the importance of active engagement and knowledge construction. The positive impact of Wordtune suggested that learners are actively shaping their understanding of effective writing through the use of AI tools. TAM was supported by the perceived effectiveness of Wordtune. The technology's capacity to enhance writing skills contributed to its perceived usefulness, aligning with TAM principles. Using Wordtune has a positive impact on writing skills, demonstrating that a cooperative and adaptive relationship between students and AI systems.

Shum et al. (2023) analyzed the use of open AF tools by teachers through the lens of teacher feedback literacy and they concluded that effective use of open

AF tools aligned with the results of this study. Both studies emphasized the active engagement of teachers in shaping their understanding of effective feedback practices through the use of AI tools. From a TAM perspective, teachers' positive experiences and competencies with AI tools supported the technology's acceptance and utilization. The effective use of open AF tools demonstrated a cooperative and adaptive relationship between teachers and AI systems, resulting in more effective interaction. Moreover, the study conducted by Yang et al. (2023) on EFL students' interactions with Pigai, the largest AI-programmed Automated Writing Evaluation (AWE) system in China, supported the findings of this research, emphasizing learners' active engagement in enhancing their language skills in terms of error corrective feedback and providing rich linguistic resources. In terms of TAM, EFL students were likely to accept technology that aided in error correction and provided valuable resources for language improvement. The provision of error corrective feedback and rich linguistic resources promotes cooperative and effective interaction between EFL students and AI systems.

On the other hand, Chen (2022) investigated the feedback and effect of Aim Writing on college students' writing in China. The study found that Aim Writing's performance was insufficient, indicating a need for a hybrid model that incorporates both Automated Essay Scoring (AES) and instructor feedback. This aligned with the findings of this study, which emphasizes the adaptive and reflective nature of learning.

7. Conclusion

This study focused on the comparative analysis of artificial intelligence (AI) automated writing feedback tools and human teacher feedback, aiming to understand their performances in developing the writing skills of English Language Learners. The study explored various dimensions, including content, vocabulary, grammar, cohesion and coherence, and overall evaluation and connecting the findings to prominent learning theories, technology acceptance models, and human-AI interaction theories.

The implications drawn from the data analysis provided valuable insights into the alignment of AI feedback with educational theories. In terms of Constructivist Learning Theory, AI feedback promoted active engagement, reflective learning, and knowledge construction across topics. TAM principles were supported by the perceived usefulness of AI in providing specific and detailed feedback, which contributed to users' positive attitudes and intentions to use the technology. Human-AI Interaction Theory findings emphasized the clarity, collaboration, and adaptability of the interaction between users and AI systems, fostering a positive user experience.

The study acknowledged the limitations of AI feedback, such as the lack of emotional support and adaptability to diverse real-life situations. It also recognized

the complementary role of human feedback, particularly in providing contextual guidance. The nuanced findings suggest a balanced approach that recognizes the strengths and limitations of both human and AI feedback, thereby contributing to a more informed and adaptive learning environment.

In conclusion, this research advances our understanding of the complex dynamics between AI-driven and human feedback in the context of language learning. The study's findings provide a foundation for further exploration and encourage educators and researchers to consider the multiple implications of incorporating AI tools into writing instruction. As technology continues to evolve, adopting a collaborative and learner-centered approach, will be crucial in shaping the future of language education.

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