Exploring the Effect of Corrective Feedback Through QuillBot on EFL Learners' Writing Skill

Mohamad Azimi[1], Majid Farahian[2]

[1]Department of ELT, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran. Email: azimione01@gmail.com

[2]Department of ELT, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran. Email: majid.farahian@gmail.com

Abstract

The utilisation of Automated Writing Evaluation (AWE) tools to provide feedback has facilitated the process of teaching and learning to write. Nowadays, teachers are better equipped to deliver constructive feedback thanks to the introduction of technology into writing classes. Considering the benefit above, the present study aimed to investigate the effect of corrective feedback through QuillBot, an Artificial Intelligence (AI) tool, on Iranian English as a foreign language (EFL) learners' writing skill. The participants were twenty-four EFL learners at the intermediate level of language proficiency. They were assigned to three different treatment groups. A five-paragraph essay was used as the pretest and posttest. The paired samples t-test findings, conducted in SPSS, showed a substantial increase in the writing abilities of the group that received QuillBot feedback from the pretest to the posttest. The one-way ANOVA test result also revealed that compared to the other groups, students in the Teacher & QuillBot feedback group considerably increased their overall writing ability. The findings of the qualitative segment of the study based on the thematic analysis of the semi-structured interview showed that students were quite satisfied with QuillBot's performance as a source of feedback. It was also claimed that there were certain drawbacks concerning specific issues that some of the students in the QuillBot feedback group were experiencing. Nonetheless, the results have demonstrated that applying AWE tools, specifically QuillBot feedback, in conjunction with teacher input can significantly enhance EFL writing instruction.

*Corresponding Author: Majid Farahian.

Department of ELT, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran.

Email: majid.farahian@gmail.com

Introduction

Since writing well is a skill required to support a significant level of language proficiency, language learners benefit significantly from learning how to write as it helps them reinforce their prior knowledge (Lam, 2021; Sotoudehnama & Fathali, 2015). Furthermore, writing is a productive skill, and for teachers to develop students' writing skill in the classroom, they should use the knowledge gleaned from teaching methods and approaches accordingly. To enable students to write on their own, teachers should use a variety of educational methods. Additionally, they should always look for creative writing exercises to incorporate into the curriculum to engage students more in learning. Nonetheless, the provision of corrective feedback plays a crucial role in the whole process of learning (Alavi & Kaivanpanah, 2007; Fithriani, 2019). Corrective feedback is a response to linguistic errors produced by learners in their oral or written production in a second language (Sheen & Ellis, 2011). CF has been a major issue in language teaching and learning for almost fifty years.

A learner can apply a wide spectrum of common practices to facilitate the writing process. Among these are computer-mediated writing practices. In this regard, most recently, the widespread use of new technologies, such as AI-based tools in educational contexts, has caused a paradigm shift in writing (O'Dea, 2024). The advent of advanced technologies and personal computers and their widespread use across all educational contexts have put language learning on a completely new path (Hubbard, 2023), and new-born technologies as new means of language learning have well replaced other outdated, conventional methods in the field of EFL.

Thus, AWE was developed to incorporate computer-based technology into EFL programs. AWE programs have taken a variety of ways throughout the years to enhance writing learning. The kind of feedback that AWE programs offer users differ, but one thing they all appear to have in common is that they give writers numerous chances to draft. After getting feedback, writers can choose whether to utilise that input to revise their writing. Given the significance of computed-mediated feedback and teacher feedback and their separate application in writing as addressed in prior research publications (e.g., Ellis et al., 2006; Ene & Upton, 2018; Sherafati et al., 2020; Wang, 2014), to our knowledge, no research has been carried out to compare and examine how the two forms above of feedback interact with one another in writing training courses. Hence, the current study aims to investigate the efficacy of computer-generated and teacher feedback in situations where they can be applied together simultaneously in educational contexts.

Language knowledge in Iranian ELT curricula is restricted to having a working knowledge of grammar rules and structures, reading and translating documents, and mastering vocabulary (Cheraghi et al., 2022; Safari & Rashidi, 2015). Writing skills are hardly included in textbooks due to an excessive focus on other abilities and subskills.

As Naghdipour and Koç (2014) put it, even if students major in teaching English as a foreign language (TEFL), English literature, or translation, writing instruction receives the least emphasis at the university level. As such, these students cannot clearly and correctly express themselves in writing (Salmani Nodoushan, 2018). This is also the case for privately run language schools that might include interactive exercises that place less emphasis on the ability. This educational framework is rooted in the conventional method of product-oriented writing (Avarzamani & Farahian, 2019), mainly because writing is viewed as a burden (Ariyanti, 2016). Hence, EFL teachers do not even consider incorporating writing feedback on students' writing and coaching them through subsequent changes in their instructional procedures (Agbayahoun, 2016).

Given the context-related limitations previously mentioned, summative evaluation of learners' writing is a method that almost all educators follow (Agbayahoun, 2016). However, the recent introduction of new technologies and the increasing use of computers in educational settings have caused the emphasis to move away from traditional learning environments and toward technology-integrated educational settings. Utilising technology in the classroom enables the integration of carefully chosen and suitable tasks with a dynamic academic setting (Dennis & Kinney 1998; Stepp-Greany 2002) and extends the learning experience into the real world of the learners (Larsen-Freeman & Anderson, 2011). Accordingly, there is great emphasis on utilising computers in writing, especially when language is limited to formal classroom settings, as in just about all EFL settings. Teachers could also provide learners with detailed guidance and individualised feedback using such technology, resulting in improved writing skills (Han & Shin 2017). Previous studies (e.g., Cui et al., 2021; Ebadi et al., 2022; Marzuki et al.,2023; Wale & Kassahun, 2024) have concentrated on independent teacher and computer-mediated feedback. However, to the researchers' knowledge, the comparative and cumulative effects of these two sorts of feedback on writing do not appear to have been studied. Furthermore, the effect of corrective feedback through QuillBot on EFL learners' writing has remained unexplored. As such, the following research questions were put forward.

- Does the provision of corrective feedback through QuillBot lead to a significant improvement in EFL learners' writing performance?
- Does the corrective feedback through QuillBot under three conditions (i.e., teacher, QuillBot, and combined) significantly affect EFL learners' writing performance?
- What are the EFL learners' views of the usefulness of corrective feedback through QuillBot in EFL courses?

Literature review

Technology in EFL writing

Since 1960, Computer-Assisted Language Learning (CALL) has revolutionised language education worldwide, though it is still an emerging concept in Iran. Hashemi and Azizinezhad (2011) assert that CALL promotes learner autonomy. It also enables students to interact with authentic language materials, such as news articles, videos, and interactive simulations, which immerse them in real-world contexts. This exposure enhances their understanding and practical use of the language (Blake, 2013). Furthermore, many CALL programs provide immediate feedback on tasks and assessments, allowing learners to identify and correct errors quickly. This prompt response is vital for reinforcing learning and improving language accuracy (Hubbard, 2009). Finally, the Internet's role in CALL ensures that learners have access to the latest language resources and information, keeping their learning relevant and up-to-date (Ghasemi, Hashemi, & Barani, 2011).

While CALL has already made significant strides in transforming language education globally, particularly in promoting learner autonomy and providing access to authentic materials, it is essential to recognise the evolution of CALL over the decades. Since the introduction of CALL to the language teaching profession more than half a century ago, many programs have been utilised to use technology in language teaching and learning. Hence, some theories were found to be used in CALL research studies, while some of them disappeared in time. A notable example is behaviourism, which advocates language drilling and mechanical activities using technology like radios, phones, blackboards, overhead projectors, spectrographs, record players, and language labs (Salaberry, 2001). The new trend harbours a more constructivist, action-oriented, and discovery-based view of language learning (Can, 2009). Constructivism and technology are closely related, and the implementation of each one benefits the other (Akayoğlu, 2019; Gilakjani et al., 2013).

The current Internet era is marked by the use of Internet-based programs, communication through computers, sites for social networking, and mobile devices, which have become widely accepted in both society and the classroom (Golonka et al., 2014) and provide new methods of instruction through enabling writing, information sharing, knowledge development, and more straightforward options for student collaboration (Aydin & Yildiz, 2014). Thus, these technological possibilities have significant pedagogical ramifications for all parties involved and necessitate several adaptations to employ the new resources.

The use of AWE in the classroom has generated debate, much like many other forms of instructional technology have. On the one hand, AWE has been praised as a way to liberate teachers, giving them more time to devote to writing education outside grading tasks (e.g., Burstein et al., 2004). However, the idea that computers can offer

useful writing critiques has given rise to a great deal of scepticism, and some studies have demonstrated controversial outcomes regarding the effectiveness of AWE (Chen & Pan, 2022). AWE systems often struggle to interpret the nuances and subtleties of writing, leading to feedback that may be irrelevant or inappropriate (Baker & Inventado, 2014). Additionally, these systems primarily focus on surface-level errors, emphasising grammatical correctness while neglecting higher-order concerns such as coherence, argumentation, and overall writing quality (Chalhoub-Deville, 2018). AWE systems also tend to provide generic feedback that does not account for individual writing styles or the specific needs of different learners, which limits their overall effectiveness (Bae, 2016). Furthermore, students may become overly reliant on AWE for feedback, hindering their ability to develop self-editing skills and critically evaluate their writing (Wang, 2019).

The reliability of AWE systems can vary significantly depending on the underlying algorithms, leading to inconsistent feedback (Zhou & Ma, 2021). Additionally, these systems do not offer emotional support or encouragement, which is essential for fostering a positive writing experience and maintaining motivation (Hyland, 2019). Lastly, AWE systems may mistakenly flag correct writing as errors, causing confusion and undermining students' confidence in their writing abilities (Li & Huo, 2020). These limitations underscore the challenges associated with AWE systems and highlight the importance of integrating human feedback into the writing process. On the contrary, as Yeha and Lob (2009) assert, providing corrective feedback or error correction via written computer-mediated communication may be crucial in helping learners develop their metalinguistic awareness, particularly when text is marked up with coloured annotations to draw their attention to specific details.

Regarding the effect of AI on EFL learners' writing skill, Marzuki et al. (2023) assessed the range of some AI writing tools and examined their influence on student writing as reported by EFL teachers. The teachers unanimously agreed that the AI writing tools enhanced their students' writing quality, particularly their organisation and content. Wale and Kassahun (2024) studied the effect of integrating Writerly and Google Docs to improve EFL writing instruction. They also explored EFL students' views towards using AI technologies. Based on the results, the integration of the AI technologies significantly promoted EFL writing instruction. More specifically, the students composed essays that showed improvement in task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy. It was also demonstrated that the group that received the treatment had positive perceptions towards integrating Writerly and Google Docs. Similarly, Ebadi et al. (2022) sought the impact of using Grammarly on EFL learners' writing skill. The results revealed that the AI tool and teacher feedback group outperformed the other groups in the posttest. In the same line, Sistani and Tabatabaei (2023) explored the effect of feedback provided by Grammarly Software on the writing skill of EFL learners. The findings revealed that

the experimental group members outperformed those in the control group, meaning the Grammarly software program positively affected the EFL learners' writing ability. Likewise, Wang et al. (2013) investigated the total impact of applying AWE on the enhancement of student writing in terms of correctness, learner autonomy, and interaction. The findings showed that after adopting AWE, there was a substantial difference in writing accuracy between the experimental and control groups. In terms of the overall impact and the investigation of students' views regarding their use of the AWE, it was found that students who used AWE exhibited a clear improvement in their writing, particularly in terms of accuracy and knowledge of learner autonomy.

Feedback on EFL writing

The debate on effective writing instruction in language teaching emphasises the importance of responding to students' writing and their ability to use feedback effectively (Thi & Nikolov, 2023). Developing writing skills becomes difficult when teachers lack the necessary pedagogical knowledge to provide targeted feedback or when students struggle to understand the feedback they receive (Agbayahoun, 2016).

There are various CF feedback types. One category is direct versus indirect corrective feedback. Direct feedback is given when teachers fix student errors in their written work. Conversely, indirect feedback is provided when the teacher inadvertently draws attention to students' mistakes in their speech (Ferris, 2003). Instructors can offer indirect corrective feedback in a few different ways: they can highlight incorrect output, write unique codes that identify the kind of problem, use colour to indicate codes, or write remarks in the text's margins (Nassaji & Kartchava, 2021). Students are encouraged to participate and edit their writing when they receive comments like this. Since students with lower proficiency seem unable to identify the correct form of their errors, this type of feedback is unsuitable for them (Ferris & Hedgcock, 2005). Ferris (2006) claims that learners prefer to receive direct feedback because they think it is more effective than receiving indirect feedback. To a certain degree, it is because students have to replicate the accurate form the teacher provided. According to Chandler (2003), direct corrective feedback is also recommended as it is the quickest and easiest method for teachers and students. In this context, computer-generated feedback emerges as a valuable tool, addressing these gaps by delivering precise writing feedback and allowing instructors to focus on aspects beyond grammar.

Rosen and Foltz (2014) highlight that computer-generated feedback aims to enhance, not replace, instructor feedback. However, the usefulness of automated essay evaluation systems has generated conflicting findings in the literature, with studies in applied linguistics and presentations at language assessment and second/foreign language writing conferences revealing varying perspectives (Cheung, 2016). Most existing research has focused on the meaning, accuracy, and reliability of automated feedback (Chodorow et al., 2010; Ferris, 2006) and its impact on the perceptions of

students and educators (Stevenson & Phakiti, 2014). Despite the advantages, AWE tools exhibit limitations that need to be considered (Hibert, 2019). Based on the literature, some limitations are a lack of long-term gains, overreliance on AWE, decreased attention to grammar, and overemphasis on linguistic errors (see Aldosemani et al., 2023).

The literature (Elliot & Klobucar, 2013; Weigle, 2013) generally suggests that automated essay evaluation systems are primarily used for decision-making in massive tests, like the College Entrance Test in China and the Graduate Management Admissions Test. (Zheng & Cheng, 2008); However, there is still debate over their use as a teaching tool for students (Cheung, 2016). On the one hand, automated essay grading tools typically cannot assess the strength of an argument and the writer's intended meaning (Ramesh & Sanampudi, 2021). Additionally, computers cannot identify all grammatical problems or assess a writer's authorial voice, and the systems could incorrectly detect some faults (Mariappan, 2022). On the other hand, academics have underlined the benefits of automated essay grading systems for spotting specific grammatical and technical mistakes (Mizumoto & Eguchi, 2023). These methods could inspire students by giving them unprompted comments on several revisions of their writing.

Additionally, computerised feedback eliminates the issue of saving "face" (Ranalli, 2022), which is hard to avoid when peers or professors conduct reviews. Hence, the discrepancies between automated feedback and instructor feedback, as stated by Dikli and Bleyle (2014) and Grimes and Warschauer (2010), are evident. Automated feedback has the advantage of providing prompt feedback on numerous versions, which may encourage students to edit their written work. As a result, automated feedback has the potential to operate as a support tool that enhances instructor input (Cheung, 2016).

Method

Design

The research design includes a sequential mixed-methods approach so that the researcher can gather both quantitative and qualitative data and profit from integrating the two. A mixed-methods approach is chosen over purely quantitative or qualitative designs because it combines the strengths of both methodologies, allowing for a more comprehensive understanding of research questions. The mixed-methods approach leverages quantitative and qualitative research strengths, allowing researchers to address complex research questions more effectively and provide a fuller understanding of the phenomena being studied. In sequential design, two strands of quantitative and qualitative approaches occur simultaneously (Farsani & Mohammadi, 2022). As a result, a pretest-posttest design was used in the quantitative portion of the study to examine the influence of QuillBot-generated feedback and teacher input on

participants' writing performance. However, in the quantitative phase, interviews with open-ended questions were used to collect participants' opinions on QuillBot-generated feedback.

Participants

Twenty-four EFL students from a well-known language college in Khoramabad, the capital of Lorestan Province, Iran., were among the participants. They were chosen randomly from a pool of 60 students (8 males and 16 females) whose course book was Four Corners 3. Another factor in selecting which students to include in the study was their interest and willingness to participate. The primary reason for selecting students, though, is based on their language proficiency. They were between the ages of 18 and 40. All study participants were required to have a minimum level of intermediate language proficiency. Intermediate proficiency learners were chosen because we believed that because they have some language skills, they are more likely to understand the feedback and apply it effectively in their writing. They were divided into three groups. In one group, participants used QuillBot to improve their EFL writing; in the other, they did so under the supervision of the teacher who was the first researcher; and in the third group, the participants received writing instruction while receiving feedback from both the researcher and the QuillBot program.

Instruments

The data was obtained using three distinct pieces of equipment.

Placement Test

The Quick Placement Test (QPT) is a dependable, time-saving, and simple-to-use tool for determining learners' competency levels. The QPT test is reliable and valid, providing a language proficiency level acknowledged globally (Zolfaghari, 2023). The QPT evaluates non-native speakers' grammar, vocabulary, and reading comprehension skills. The test consists of 60 multiple-choice questions and takes 45 minutes to complete. It helps place learners in appropriate language courses by scoring them according to the Common European Framework of Reference for Languages (CEFR), ranging from A1 (beginner) to C2 (proficient). According to the guidebook provided for interpreting test scores, those scoring 0-10 are beginners, 11-17 are breakthroughs, 18-29 are elementary, 30-39 are intermediate, 40-47 are upper intermediate, 48-54 are advanced, and 55-60 are highly advanced. Those who scored between 30 and 47 on the scale were chosen to participate in the present study. The Jacobs et al. (1981) scoring rubric was applied to grade the essays. The Jacobs et al. (1981) scoring rubric, often called the ESL Composition Profile, is a widely used analytic scoring rubric for evaluating written compositions, particularly for non-native English speakers. The

rubric breaks down the writing assessment into five key components, each with specific criteria and a range of points. These components allow a more detailed and nuanced evaluation of a student's writing ability.

Essay Writing Tests

The current study also conducted a writing pretest and posttest. The learners were required to prepare a five-paragraph essay on a topic chosen by the teacher to obtain students' scores for the pretest and, subsequently, the posttest phase of the study. The students' familiarity with the subject was considered when selecting the topics. Two teachers graded the essays to assess each individual's score more accurately. The maximum possible score for a flawless essay was 100.

QuillBot Software

QuillBot is an online application that aids writing, prevents plagiarism, condenses lengthy sentences, and enhances grammar to make it more transparent and professional. There are two versions of this application: free and premium. The benefit of this program is that it efficiently identifies mistakes within sentences. The tool's maximum character limit can be increased to 10,000 in the premium edition. There are seven helpful features in QuillBot; among them: Standard mode strikes a balance between altering text and preserving the original meaning, Fluency mode focuses on enhancing clarity and correcting grammar, Formal mode provides a more polished and professional tone, Simple mode makes the language more straightforward, Creative mode emphasises diverse and expressive rewording, Expand mode adds detail to increase text length, and Shorten mode makes content more concise. The tool includes features such as a synonym slider for adjusting the level of rephrasing, highlighting to show changes and integration with platforms like Google Docs for seamless use. If you want to write more words overall, this option can help. The only modes available to QuillBot-free users are Standard and Fluency. Meanwhile, the premium edition only offers the Creative, Academic, Shortened, Expanded, and Formal modes. The study's participants utilised QuillBot in its standard fluency modes since those were the only options accessible in the free version.

Interviews

Semi-structured interviews were conducted to assess participants' views about the efficacy of the QuillBot feedback. The study's posttest phase was followed by the administration of the interviews, which were recorded for later data processing. Nine randomly selected Teacher & QuillBot and QuillBot feedback group members participated in in-person, face-to-face English interviews. Each interview lasted about 10 minutes and consisted of three questions (Appendix). A focused group of nine

participants allowed researchers to conduct an in-depth qualitative analysis. This smaller sample size made it feasible to thoroughly explore each participant's experiences and perspectives, providing rich and detailed insights. In qualitative research, the aim is to gain a deep understanding of specific phenomena rather than generalising findings to a larger population. By carefully selecting nine participants who represent the study's key variables, researchers obtained valuable insights that, while not broadly generalisable, were highly relevant and informative for understanding the wider population.

Data Collection

The QPT test was administered to a sample pool of 60 EFL learners to remove those who could not meet the minimum threshold of intermediate competency. After ensuring the required skill level, the students were randomly divided into three groups to receive one of the instructor feedback, QuillBot-generated feedback, and a mix of the two. All students had to write a 150-word essay as a pretest before receiving instruction. Throughout the course, the three groups received the same syllabus, which included prewriting, drafting, revising, and editing. However, the type of feedback received by each group differed from that of the other groups. Students completed a posttest writing assignment at the end of the course, and the instructor also interviewed them to see how they felt about the QuillBot feedback they had received.

The training had nine sessions, all of which were hour-long sessions. Training sessions covered an introduction to writing principles, familiarisation with automated feedback through QuillBot, and guidance on understanding and applying the feedback received. Participants were taught writing techniques to improve their drafts, incorporate constructive feedback, and practice writing while receiving real-time automated feedback. Moreover, the specific topics and skills addressed included writing mechanics (grammar and punctuation), organisation and structure (thesis development and paragraph coherence), and content development (idea generation and use of evidence). Additionally, the sessions focused on clarity and style, revision strategies, interpretation of feedback from automated tools, and the effective use of technology. Together, these elements aim to enhance students' writing abilities and ability to utilise feedback for improvement effectively. Accordingly, the participants completed a writing pretest during the study's first session. Additionally, the three groups received information regarding various aspects of the feedback given by the instructor, automatically generated feedback by the QuillBot software, or a combination of the two. The participants in the course composed essays on chosen topics, received comments on them, corrected the drafts, and then wrote the composition from scratch. Each session, in particular, required the participants to create a composition.

Participants wrote their compositions in their notebooks in the class, where the teacher provided feedback. The teacher then read each student's work and provided

both vocal and written feedback on the board. It would take the form of both written comments and class discussion. Teacher feedback was provided in various formats, including written comments, oral feedback, and individual and group conferences. Written comments offer detailed, personalised critiques, while oral feedback allows for interactive one-on-one or classroom discussions. Individual conferences provide tailored guidance, and group conferences promote collaborative learning. The feedback is given both regularly throughout the writing process as formative feedback and at the end of assignments as summative feedback.

The correction included teaching sentence structure, the proper use of certain words and prepositions, and the precise application of grammar rules. Instead, in the class that received feedback through QuillBot, students entered their drafts into the program and received automated comments based on what they had written. A sample draft typed in QuillBot Grammar Checker via one of the students in the QuillBot Feedback group is displayed below.

Figure 1

Sample draft typed in QuillBot Grammar Checker
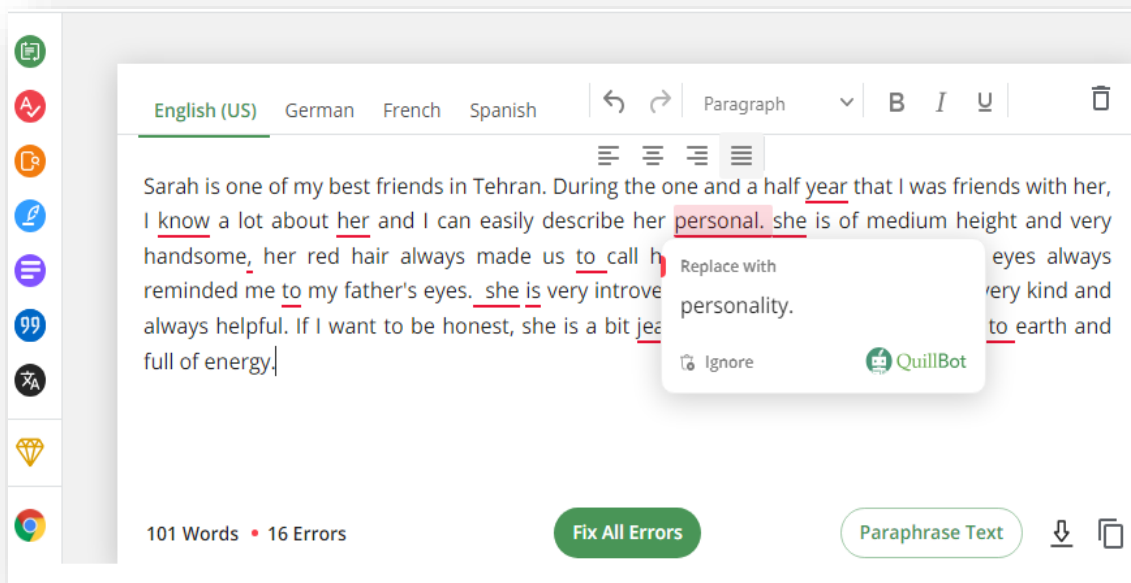
The draft of a student is shown in Figure 1 from one of the training sessions during the course. As demonstrated, QuillBot underlines errors as they happen. Additionally, if you hover your mouse pointer over any highlighted word or sentence, QuillBot will instantly detect the mistakes and provide the proper corrections. If you click the "Fix All" Errors button at the bottom of the image, QuillBot will instantly fix all the identified errors. Additionally, there is a button called "Paraphrase Text" that, when clicked, will

direct one to QuillBot's paraphraser section, which provides additional feedback in terms of alternative words and phrases that help students enhance the quality of their text.

Finally, pupils in the third class received feedback from QuillBot and the teacher. Adding the two exposed them to various comments on their writing. Besides receiving teacher evaluation, Students in this group benefited from instructor explanations of QuillBot feedback in areas where they needed more clarity. Additionally, eight individuals were chosen from the three groups to participate in interviews. Each participant's response to the questions took more than two minutes. The responses were then collected for additional analysis.

Data Analysis

The first research question was analysed using a paired-sample t-test, the second with a one-way ANOVA, and thematic analysis was employed for qualitative data. According to Braun and Clarke (2006), the primary purpose of thematic analysis as a stand-alone qualitative descriptive methodology is to find, examine, and report patterns (themes) within data. In thematic analysis, a collection of common threads that run across an entire interview or group of interviews are sought for and identified (DeSantis & Noel Ugarriza, 2000). The interview data was thoroughly evaluated to learn more about the participants' experiences with QuillBot. Data pertinent to each code was gathered after the intriguing elements of the data were methodically coded throughout the whole data set. Then, all data relevant to each potential theme was gathered by collating codes into potential themes. The details of each theme and the whole story conveyed were refined in the following analysis stage to produce precise titles and definitions for each theme. In the end, statements that were vivid and compelling were chosen. The entire analysis was compared to the research question, and an analysis report was written.

Results

Results of Quantitative Analysis

First, assessments of the homogeneity and normality of pretest scores were conducted to ensure that participants were at the same level of language proficiency before undertaking the study. After assigning students to their respective groups, the researchers employed a one-way ANOVA test to determine whether or not the groups were homogeneous. The data is standard since a non-significant value (p >.05) was achieved. To ensure the sample's homogeneity, the pretest mean scores of the three groups were compared using a one-way ANOVA test.

The number of students who took the test in each group is 8. The mean of the participants' scores in the QuillBot Feedback group is 51.75, the mean of the

participants' scores in the Teacher Feedback group is 51.5, and the mean of the participants' scores in the Teacher & QuillBot group is 53.5.

The findings of the one-way ANOVA test show a significance of 0.388, and when compared to the alpha decision level of 0.05, it can be inferred that the three groups, with high certainty, are homogeneous. This means there is no significant difference between the participants in the three groups regarding their knowledge of English proficiency.

To reinforce the results of the above observation, the researcher did another test (multiple comparisons using one-way ANOVA). The significance between the groups is always higher than the alpha decision level (0.05), supporting the earlier assumption that there are no variations in the participants' level of language proficiency.

Descriptive statistics of the pretest and posttest scores in the QuillBot Feedback group were performed to address the first research question. The tables below compare the observed pretest and posttest scores in the QuillBot Feedback group.

Table 1.
Descriptive statistics of pretest and posttest scores in the QuillBot Feedback group

		Mean	N	Std. Deviation	minimum	maximum
QuillBot Feedback	pretest	51.7500	8	3.28416	45	55
	posttest	63.5000	8	2.56348	61	69

As shown in the above Table, the number of students who took the test within the group is 8, the mean of the pretest scores equals 51.75, and the mean of posttest scores is 63.5. The standard deviation of the pretest scores is 3.28, and the standard deviation of the posttest scores is 2.56. The lowest score in the pretest scores is 45, the highest score is 55, the lowest score in the posttest scores is 61, and the highest is 69. The posttest findings reveal that the members of the QuillBot feedback group had a noticeable improvement in their writing skills.

According to the data, it was observed that the mean of participants' scores in the pretest scores equals 51.75, and the mean of posttest scores is 63.5. There is a significant difference between the pretest and posttest scores based on the relevant level of significance (0.000) found in the data analysis and the comparison with the alpha level (0.05) (Table 2).

Table 2

Paired-Samples t-test on pretest and posttest scores of the QuillBot Feedback group

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	pretest - posttest	-11.75000	4.06202	1.43614	-15.14593	-8.35407	-8.182	7	.000

The three groups' descriptive statistics of posttest scores were performed to address the second research question (see Table 4). However, before that, the normality test was run to ensure the participants' posttest scores were normal. The results are shown in Table 3.

Table 3

Normality test for the posttest scores of the three groups

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Quillbot	.221	8	.200*	.835	8	.066
Teacher	.211	8	.200*	.863	8	.127
Teacher&QuillBot	.216	8	.200*	.882	8	.197

As illustrated in the above Table, all the reported signatures are as follows: amounts are higher than 0.05, which signals the data's normality.

Table 4

Descriptive statistics of posttest scores in the three groups

groups	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Teacher Feedback	8	60.62500	1.407886	.497763	58.000	62.000
Teacher&QuillBot	8	65.87500	1.125992	.398098	64.000	67.000
QuillBot Feedback	8	63.50000	2.563480	.906327	61.000	69.000

As shown in the above Table, the number of students who took the test within each group is 8, and the mean of the scores in the QuillBot Feedback equals 63.5, 60.62 in the Teacher Feedback group, and 65.87 in the Teacher & QuillBot group. The standard deviation in the QuillBot Feedback group is 2.56, 1.40 in the Teacher Feedback group, and 1.12 in the Teacher & QuillBot group. The lowest score in the QuillBot Feedback group is 61, the highest score is 69, the lowest score in the Teacher Feedback group is 58, and the highest is 62. Also, the lowest score in the Teacher & QuillBot group is 64, and the highest is 67.

Concerning the second research question, a one-way ANOVA test was used to determine the degree of significance among the three groups. The results are displayed in the following Table.

Table 5

One-way ANOVA test on the posttest scores of participants

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	110.583	2	55.292	16.889	.000
Within Groups	68.750	21	3.274		
Total	179.333	23			

As illustrated, the reported significance level is 0.00, which is lower than 0.05. It indicates that the posttest results are significant, but since we cannot identify the precise source of the significance, a multiple-comparison test was conducted to identify it. The following Table shows the outcome.

Table 6

Multiple comparisons on posttest scores using one-way ANOVA

		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Teacher Feedback	Teacher&QuillBot	-5.250000*	.904684	.000	-7.53032	-2.96968
	QuillBot Feedback	-2.875000*	.904684	.012	-5.15532	-.59468
Teacher&QuillBot	Teacher Feedback	5.250000*	.904684	.000	2.96968	7.53032
	QuillBot Feedback	2.375000*	.904684	.040	.09468	4.65532
QuillBot Feedback	Teacher Feedback	2.875000*	.904684	.012	.59468	5.15532
	Teacher&QuillBot	-2.375000*	.904684	.040	-4.65532	-.09468

As can be seen, the significance observed when comparing the QuillBot & Teacher group with either of the other groups is lower than 0.05, which means that this group is different from the other groups.

According to the information presented in the Table above, we can conclude that students in the QuillBot & Teacher group outperformed the participants in both groups in terms of their overall writing performance.

Results of Qualitative Analysis

Eight students were interviewed for the study's qualitative part. Then, the most common answers were compiled and looked into for analysis. Students in the QuillBot & Teacher group stated that they benefited greatly from the collective suggestions from both the teacher and the QuillBot software. They noted that adding teacher feedback made the entire learning process more effective and accessible. They also reported that they benefited from teacher explanations on word choice and sentence construction. They found the addition of teacher comments and explanations to be quite encouraging. Furthermore, they indicated that utilising QuillBot in their academic writing decreased their writing anxiety and boosted their confidence in the calibre of their writing, as shown by the following excerpts.

QuillBot is a great writing tool. I think it's better than any other writing assistant. Sometimes, the feedback is a bit vague, but hopefully, the teacher can totally dumb it down and make it completely understandable. I was always afraid of writing, but I think QuillBot can help me write better and more confidently. I believe the combination of

QuillBot and teacher does magic. I really like the way it works, and I hope I can make better use of it in the future.

Students in the QuillBot group stated they liked the variety of feedback they received from the software. Compared to typical classrooms, they considered the experience highly time-consuming. One thing they were dissatisfied with was that the comments they received were occasionally rather vague and that they would have wanted teacher explanations on them. Another student argued that QuillBot may make him lazy in his writing. In general, they were content with their experience.

Well, QuillBot is great in all aspects. I like the grammar checker and the variety of alternative options that it provides. They are more accurate and more grammatically correct. I especially liked how QuillBot provided formal and casual formats for my text. The thing is that sometimes I don't understand the reason for my mistakes, and QuillBot does not seem to be able to explain them to me. It only provided the correct form and other options, so I needed to keep thinking about my mistakes. It would become really challenging and time-consuming.

The experience that I had with QuillBot was spectacular. I had no idea that AI could make writing this easy. It's really great. I had spent a lot of time writing before, and it was challenging for me, but using QuillBot saved me a lot of time. Overall, I think it's great, but I also believe that it makes me lazy in writing, so I never try to think about my writing.

The data from the interviews were studied, revealing that the students were generally content with the QuillBot software and satisfied with the progress made.

Table 7 shows the results of the qualitative phase of the study based on thematic analysis. Following the study of the transcribed interviews using thematic analysis, several themes were produced, as shown in Table 7. The Table presents the advantages and disadvantages of using QuillBot. Students' expectations about AI-based writing assistance were investigated prior to utilising QuillBot. Before taking the course, none of them had tried QuillBot, though a few were aware of emerging AI-based writing tools.

Table 7

EFL learners' views of corrective feedback through QuillBot in EFL courses

Categories	Themes	Example
1. EFL learners' expectations from feedback through QuillBot before employing it as a treatment	a. It helps you have native-like writing	*AI-based writing tools are known to develop native-like writing proficiency.*
2. EFL learners' positive perceptions regarding using QuillBot after using it as the treatment	a. variety of feedback	*I like the variety of alternative options that it provides.*
	b. reducing anxiety	*Writing has always been challenging and stressful for me. I think QuillBot has helped me with it immensely*
	c. eliminating spelling, grammar, and punctuation mistakes	*QuillBot made my spelling mistakes fewer, and the grammar checker does a great job of detecting mistakes*
	d. improving your writing skill	*but I think QuillBot can help me write better and more confidently*
	e. offering tips, suggestions, and advice on your writing style.	*I especially liked how QuillBot provided formal and casual formats for my text.*
3. EFL learners' negative attitudes toward using QuillBot	a. rather vague	*Sometimes, the feedback is a bit vague, but hopefully, the teacher can simplify it and make it completely understandable.*
	b. time-consuming	*By using QuillBot, I saved a lot of time.*

Figure 2

A summary of the results of the interview analysis
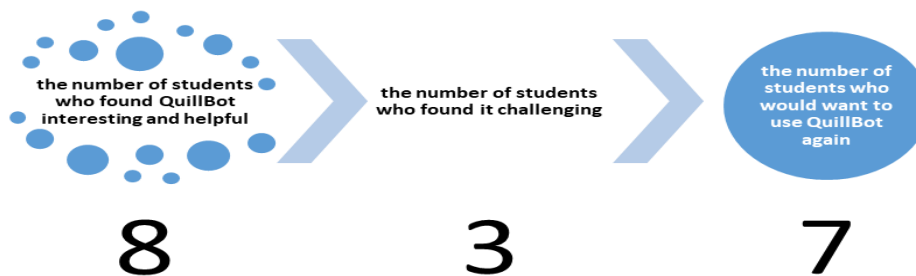
The above Figure provides a concise overview of the qualitative portion of the study based on the three interview questions. As seen, everyone who participated in the interview enjoyed QuillBot and how it makes writing easier. QuillBot presented a challenge to three interviewees, but seven said they would use it again.

Discussion

The first research question investigated the effect of corrective feedback through QuillBot on EFL learners' writing. The data analysis showed that the provision of corrective feedback through QuillBot significantly impacted the writing ability of students in the QuillBot feedback group. The findings are consistent with those of Wang et al. (2013), who discovered that students may improve the accuracy of their writing by utilising enhanced syntax, word choice, and spelling when they receive thorough diagnostic feedback from AWE programs. Several additional studies also came to similar conclusions regarding enhancing students' writing abilities due to computer-generated feedback. For instance, Tuzi (2004) found that computer-generated feedback was more likely to influence students' revision of their work than spoken feedback and prompted them to concentrate on macro-rather rather than micro-level modification. In the same line, Marzuki et al. (2023) assessed the efficacy of some AI writing tools and explored their impact on student writing. Based on the results, AI writing tools positively enhanced their students' writing quality, particularly the content and quality of their organisation. In a partially similar study, Wale and Kassahun (2024) sought the efficacy of integrating Writerly and Google Docs to promote EFL writing skill. As it was revealed, the integration of AI technologies significantly promoted EFL writing.

One possible explanation for the present study's findings is that QuillBot has numerous features. First, Modern AI is used by QuillBot to correct a sentence, paragraph, or article. QuillBot can help users improve their writing immediately by cutting out unnecessary words and supporting them in communicating their ideas. Second, it enhances meaning and clarity. Users of QuillBot can write in their preferred style thanks to the writing modes. In addition, employing AWE helps students address their errors by applying logic, common sense, and language proficiency (Zaini & Mazdayasna 2014). Technology providing immediate feedback may encourage students to revise their work (Moore & MacArthur, 2016).

The results contrast with some earlier research that indicated no substantial impact of computer-based feedback on learners' writing abilities when considering the overall efficacy of computer-generated feedback. For instance, Saricaoglu (2018) found no statistically significant difference between learners' pretest and posttest scores in her study to assess the effectiveness of automated feedback on enhancing learners' written causal explanations. Additionally, Nagata (1996) claimed that computer-assisted language learning instructions do not provide significant appropriate feedback on learners' writing.

Regarding the second research question, which aimed to compare the three types of feedback mentioned (i.e., teacher feedback, QuillBot feedback, and Teacher & QuillBot feedback), it can be said that participants in the Teacher & QuillBot feedback group demonstrated a significant improvement in terms of their overall writing performance. Accordingly, the results of this section of the study make it clear that

providing teacher feedback on top of QuillBot feedback can serve as a booster. Therefore, it can be said that improving students' writing is more successful when QuillBot feedback is combined with teacher feedback than when QuillBot feedback is used alone. In other words, enhancing students' writing is more successful when QuillBot feedback is paired with teacher feedback rather than when QuillBot feedback is used independently. This partially aligns with the finding reported by Fu et al. (2022) since they reported that AWF can positively impact learners' writing skill, but it is not as effective as feedback provided by humans. One possible explanation for the finding is that some students find using QuillBot challenging, and they may require additional clarification for specific feedback they receive because they find it rather vague. This ambiguity can leave students unsure of how to effectively apply the feedback to improve their writing.

Additionally, AWE tools might not always address specific errors in a comprehensible way to all learners, particularly those still developing their language skills. For example, if the feedback highlights an issue with sentence structure without offering a clear explanation or example, students may feel lost and unable to make meaningful revisions. This lack of clarity can lead to frustration and decreased motivation, as students may not receive the guidance they need to improve. This is in tandem with Harrer (2023), who argues that GenAI may be biased, inaccurate, or harmful; therefore, it seems that "thus their use requires human oversight" (Chan & Hu, 2023, p.3). The results are also consistent with the results of Ebadi et al. (2022), who investigated the effect of Grammarly on EFL learners' writing achievement. Based on the results, the AI tool and teacher feedback group outperformed the other groups in the posttest.

Concerning the third study question, interviews were conducted with EFL students to get their opinions on using QuillBot feedback. After receiving the treatment, only the students in the Teacher & QuillBot feedback group and the QuillBot feedback group were subjected to interviews to discover more about how they felt about the quality of feedback. As they reported, English language learners can utilise QuillBot as a writing companion to improve their writing. They also had a favourable opinion of the effects QuillBot had on the development of their English language, particularly in terms of lexical sources. They noted that they tend to rely more on QuillBot in the future when producing summaries. The result aligns with previous studies conducted by Kurniati and Fithriani (2022) and Fitria (2021), who discovered that most post-graduate students believed using Quillbot improved their academic writing. Also, the current study's findings are consistent with other studies (e.g., Zhang, 2017; Zhang & Hyland, 2018), which found that student motivation increased their engagement with AWE feedback during the writing process.

This study uncovers an important finding: EFL learners perceive that using QuillBot improves their writing skills, helps reduce their anxiety, and boosts their confidence. Additionally, QuillBot serves as a supportive tool that alleviates the pressure of writing in a foreign language, allowing learners to experiment and revise their work

without fear of judgment. This immediate feedback can foster a sense of security, enhancing their confidence in their writing abilities. As learners feel more empowered and supported, they will likely engage more actively in writing tasks and take risks with the language, contributing positively to their overall language development and academic success. Further research can shed light on AWE feedback and teacher input's role in EFL learners' affective factors.

Conclusion

It is general knowledge that Learning to write flawlessly is a challenging process. If students want to improve as writers, they must use the best tool available for corrective feedback. Students deciding whether or not to utilise QuillBot to enhance their writing may find great value in the findings of the interviews included in this research. QuillBot may be helpful since numerous EFL learners, including those studying in Iran, constantly seek the most effective means of feedback delivery. Moreover, among various methods of providing feedback, it appears that the concurrent use of technology and teachers as sources of feedback will improve students' overall writing abilities better than when either is used separately.

The findings of this study provide valuable insights and recommendations for both EFL students and teachers. One essential suggestion is for teachers to integrate new AI-powered technologies into their instructional practices to enhance students' writing skills. The results indicate that EFL teachers should consider incorporating QuillBot and their feedback into their curriculum, particularly those focused on teaching writing techniques. This approach would not only familiarise students with the tool but also guide them on effectively utilising the corrective feedback it offers. By doing so, teachers can help students better understand their writing strengths and weaknesses and, perhaps, at the same time, increase motivation and build a supportive classroom climate.

Although the current study answers the research questions, there are some limitations to consider. First, the results should be cautiously extrapolated to other contexts because of several research constraints. The participants in the study were intermediate learners, so it is advised that the study be repeated with individuals at different levels of language proficiency to determine whether they perceive QuillBot feedback similarly and how much progress they make. Second, a small sample size was employed in the study. Utilising a bigger sample size would result in more reliable results. Also, this study is still restricted in that it only explores students' perspectives. Further investigation and consideration of teachers' opinions are required to fully comprehend the effects of QuillBot on students' paraphrasing abilities.

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