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QUILLBOT-ASSISTED COLLABORATIVE WRITING: IMPACT ON EFL STUDENTS' DESCRIPTIVE WRITING AND SELF-EFFICACY

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Abstract:

This study investigates how QuillBot-assisted Collaborative Writing affects EFL students' descriptive writing performance and self-efficacy. Employing a quasi-experimental design, 45 Indonesian senior high school students were divided into control (21 students) and experimental groups (24 students). The experimental group engaged in collaborative writing with QuillBot, while the control group followed a conventional teacher-centered approach. Data collection included pre-test and post-test writing assessments and a self-efficacy questionnaire. Mann-Whitney U test was applied to analyze the data due to violations of normality and homogeneity assumptions. The result revealed a significant difference in post-test scores between the groups. Meanwhile, self-efficacy showed no statistically significant influence on writing performance. These findings suggest that QuillBot-assisted Collaborative Writing enhances students' interaction and writing proficiency. The use of QuillBot provides timely feedback and reduces the teachers' load. Future research should explore long-term effects, student engagement levels in the areas of cognitive, behavior, social, and affective engagement, and qualitative perspectives on AI-assisted writing in K-12 setting. This research contributes to the growing discussion related to QuillBot's roles in language learning, emphasizing its abilities as a complementary rather than autonomous instructional tool.

Keywords: *Collaborative writing, Descriptive writin, Self-efficacy, Quillbot,*

Abstrak:

Studi ini menyelidiki bagaimana Penulisan Kolaboratif berbantuan QuillBot memengaruhi kinerja penulisan deskriptif dan efikasi diri siswa EFL. Dengan menggunakan desain kuasi-eksperimental, 45 siswa SMA Indonesia dibagi menjadi kelompok kontrol (21 siswa) dan kelompok eksperimen (24 siswa). Kelompok eksperimental terlibat dalam penulisan kolaboratif dengan QuillBot, sedangkan kelompok kontrol mengikuti pendekatan konvensional yang berpusat pada guru. Pengumpulan data termasuk penilaian penulisan pra-tes dan pasca-tes dan kuesioner efikasi diri. Tes U Mann-Whitney diterapkan untuk menganalisis data karena pelanggaran asumsi normalitas dan homogenitas. Hasilnya mengungkapkan perbedaan yang signifikan dalam skor pasca-tes antar kelompok. Sementara itu, efikasi diri tidak menunjukkan pengaruh yang signifikan secara statistik pada kinerja penulisan. Temuan ini menunjukkan bahwa penulisan kolaboratif berbantuan QuillBot meningkatkan interaksi dan kemahiran menulis siswa. Penggunaan QuillBot memberikan umpan balik tepat waktu dan mengurangi beban guru. Penelitian di masa depan

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harus mengeksplorasi efek jangka panjang, tingkat keterlibatan siswa di bidang keterlibatan kognitif, perilaku, sosial, dan afektif, dan perspektif kualitatif tentang penulisan berbantuan AI dalam pengaturan K-12. Penelitian ini berkontribusi pada diskusi yang berkembang terkait dengan peran QuillBot dalam pembelajaran bahasa, menekankan kemampuannya sebagai alat pelengkap daripada alat instruksional otonom.

Kata kunci: *Penulisan kolaboratif, quillbot, efikasi diri, penulisan deskriptif*

INTRODUCTION

While students are acquiring English in an EFL environment, writing proficiency is essential for intercultural communication and academic (Crystal, 2003; Ersanlı & Yeşilel, 2022). However, there are some problems in K-12 classrooms. Some writing problems commonly exist in L2 writing classrooms, including the absence of metalanguages in written communications, mechanics aspects, lack of correctness, comprehensibility, restricted vocabulary, clarity and appropriacy-related issues (Pasaribu et al., 2024; Ersanlı & Yeşilel,Nurlatifah & Yusuf, 2022 2022). Therefore, the process-based writing approach providing scaffolding and timely feedback must be applied to address these issues.

Unfortunately, teachers often struggle to provide sufficient feedback and assessment (Lee & Kim, 2025) due to the time limitation. To overcome these challenges, teachers might need to integrate various approaches and technologies (Blumberg, 2010; Al-Khairy, 2013). QuillBot become the recent technology which can be applied since it is easy to use, accessible and provides timely feedback throughout various stages in the writing procedure. In the meantime, Collaborative Writing (CW) also becomes a promising strategy to overcome the issues in writing class due to its nature, such as encouraging peer interaction and boosting global writing features like organization (Storch, 2019; Zhang & Zou, 2021).

Previous research was done to integrate Collaborative Writing and Google Docs (Albesher, 2024). It specifically shows that Google Mediated Collaborative Writing (GMCW) pays more attention to global features of writing, such as development, cohesion, and organization. However, it encounters limitations with local writing aspects, such as spelling, punctuation, vocabulary,and sentences. Moreover, R. D. Pratama et al. (2025) found that the Collaborative Writing integrated with human and AI promoted positive student perceptions and experiences during the writing process. The findings also indicated that the experimental group outperformed the control group in writing achievement.

Collaborative Writing is a type of pedagogical task that involves two or more learners to communicate and collaborate continuously to compose a single text (M. Zhang & Crawford, 2022). Besides, the recent studies displayed that the students who applied Collaborative Writing training had better enhancement on the content, coherence of paragraphs, and writing proficiency for individually and collaboratively prepared papers (Q. Zhang, 2020; Rezeki & Rahmani, 2021; Anshu & Yesuf, 2022;Pham, 2021). The experimental group also had positive perceptions, positive attitudes, and high motivation to write after studying under Collaborative Writing approach. In addition, collaborative dialogues in Collaborative Writing indicated that pair work provides co-construction of texts, integrate their language knowledge and ideas, and achieve better grammatical accuracy and linguistics complexity (Q. Zhang, 2020). Furthermore, a study revealed that the students agreed that Collaborative Writing could enhance the learners' writing skill, particularly on structuring and elaborating on ideas, and enabling them to write a better essay than before (Rezeki & Rahmani, 2021). The collaborative activities in writing stages enhance the engagement and motivation and it leads the student to write better and produce a piece of text with better grammatical accuracy and linguistics complexity.

The recent trends of research in educational setting also focus on the usage of Artificial Intelligence tools in instructional settings (Zhao et al., 2023; Eshelman, 2024; Ziqi et al., 2024; Kim et al., 2022). The scholars also examine the implementation of AI utilized as a means of providing feedback for learners in the writing course (Link et al., 2022) and give assessments of the learners' writing in the classroom (Zhao et al., 2023). This assistance can reduce the work load of the teacher in the L2 writing class.

In addition, Pratama et al., (2025) says that that the learner who used QuillBot during writing stages had higher score of writing compared those who did not use QuillBot. The QuillBot application as one of AI tools can enhance the Senior High School student's ability to paraphrase (Mohammad et al., 2023). It also provides some grammar checking that helps students check the grammar of their writing. In addition, the feedback produced by QuillBot offers a favorable impact on the students' writing, especially the quality of organization, grammar, punctuation, and content (Marzuki et al., 2023; Azimi & Farahian, 2024; Amanda et al. 2023). The positive contribution of QuillBot during the stages of writing development not only provide the development of students' writing skill, but also reducing the students' reliance

on conventional teacher-provided feedback (Pratama et al., 2025) . Surprisingly, the integration of QuillBot additionally fostered improvements in learners' belief in their own writing abilities and reduced their anxiety throughout the composition process(Said & El-Garawany, 2024a).

Self-efficacy is an essential psychological factor which influence writing achievement (Bruning et al., 2012; Noorhaya Sari, 2021). As outlined by Bandura (2017), self-efficacy describes a learner's assured confidence in their ability to plan and carry out the necessary tasks for achieving particular goals. This absence is critical to investigate in K-12 setting, as self-efficacy's impact remains debatable. Some studies report weak correlations with performance (Binnendyk et al., 2024), while others emphasize its motivational role (Bandura, 1997; Pintrich, 1999).

In recent years, some scholars have examined the use of Collaborative Writing integrating with some technologies, such as: online word processors, chat platforms, blogs, and wikis (Sun & Chang, 2012; Kessler et al., 2012; Kessler, 2009; Elola & Oskoz, 2010; Kessler & Bikowski, 2010; Aydin & Yildiz, 2014). Besides, some studies have focused on AI tools (Zhang & Zou, 2021; Wiboolyasarin et al., 2024, Noorhaya Sari, 2021; Bruning et al., 2012) as standalone solutions. In addition, some researches focus on Collaborative Writing integrating with AI and Google Document in the university level(Albesher, 2024; R. D. Pratama et al., 2025). However, the research which focuses on investigating the incorporation of particular AI-based applications, including QuillBot-assisted Collaborative Writing among K-12 students and self-efficacy is underexplored. This gap highlights the need to integrate AI-assisted writing tool like QuillBot, which provide automated feedback on paraphrasing and grammar (Mohammad et al., 2023; Marzuki et al., 2023) in the context of Collaborative Writing (CW) for K–12 classrooms.

The current investigation is designed to respond to these research voids through an exploration of how QuillBot-assisted Collaborative Writing affects descriptive writing skill and self-efficacy in high school learners. Grounded in Vygotsky's sociocultural framework, which maintains that knowledge development is supported by interaction with others and supported by scaffolding, we propose that the integrating collaboration among peers with AI feedback will improve descriptive writing proficiency while reducing the teachers' workload. Besides, we investigate whether self-efficacy levels influence the writing outcomes.

This study has some potential contribution both empirical and practical. The investigation of QuillBot-assisted Collaborative Writing compared to the conventional method provides understanding of how specific Artificial Intelligence tools, like QuillBot, can complement – not replace – the role of English teacher. In addition, these outcomes demonstrate that the application of Artificial Intelligence in the writing class can reduce the workload while maintaining the quality of teaching (Latifah et al., 2024; Lee & Kim, 2025).

The application of Collaborative Writing and QuillBot in K-12 setting are in line with Vygotsky's sociocultural theory, which emphasizes that learning develops through social interaction (Rahmatirad, 2020) and scaffolding – temporary assist to the learners, which is gradually erased as they can do the activities independently (Peker et al., 2024;Le, 2021). Collaborative Writing activate peer-mediated knowledge construction (Storch, 2019), while QuillBot has a role as a technological scaffold, providing immediate feedback during the writing process (Link et al., 2022). Accordingly, this research seeks to contribute to the expanding literature on how combining Collaborative Writing with QuillBot influences students' descriptive writing performance. This research further examines whether students with varying levels of self-efficacy demonstrate significant differences in writing performance when instructed through QuillBot-supported collaborative writing.

More specifically, this investigation poses two guiding questions:

1. To what degree does the integration of QuillBot into Collaborative Writing enhance EFL learners' writing achievement relative to conventional approaches?
2. Are there significant differences in writing performance between learners with high versus low self-efficacy when engaging in QuillBot-assisted collaborative writing?

METHOD

Design

A quasi-experimental 2 × 2 factorial design was utilized in this study, consisting of two established class cohorts, one serving as the experimental group and the other as the control group. Learners in the experimental class engaged in collaborative writing tasks supported by QuillBot, while those in the control group received conventional teacher-led writing instruction. The objective was to investigate how different teaching approaches, paired with students' level

of self-efficacy (high or low), affected the writing ability. To assess any changes generated by the intervention, a pre-test and post-test were administered to both groups on descriptive text writing. This method was considered appropriate for the classroom situation, since random selection was not practical but structured assessment was still allowed. The process of data collection and treatment procedure are displayed as follow in Figure 1.

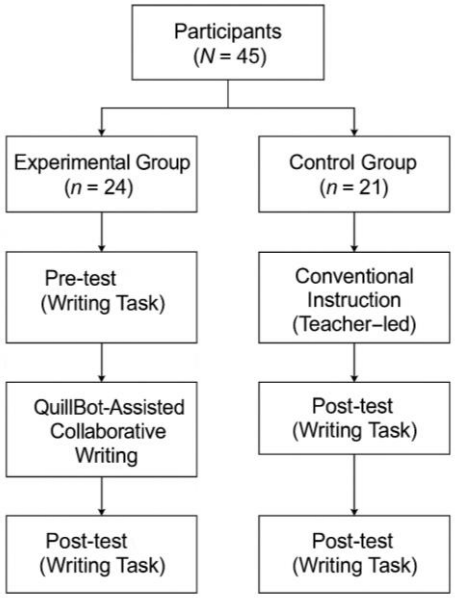

Figure 1. Flow of Data Collection and Treatment Procedure

Participant

There are forty-five tenth graders from an Islamic Senior High in Bondowoso, East Java, Indonesia, participated in this research. Besides, this study utilized the convenience sampling method to determine the sample, taking consideration of class availability and school's recommendation. A total of 24 students were assigned to the experimental group, compared to 21 participants in the control group. All students involved were female, reflecting the gender composition of the existing classes.

Before the intervention began, all of the participants received a pre-test to verify that the groups had equivalent initial writing abilities. The findings showed that no notable statistical distinctions existed between the two groups ($p > .05$), which means that the students' initial writing skills were probably about the equivalent levels. Besides, the students already knew

how to used basic digital tools and Artificial Intelligence tools. In addition, this study was carried out twice a week for three weeks, during a total of approximately nine hours in writing class.

Instrument

The instruments employed in the context of this investigation comprised a baseline test, a post-intervention test, a writing assessment rubric, and a self-efficacy scale. Both the baseline test and the post-intervention test required students to produce a descriptive text of approximately 150 words, focusing on describing a person, place, or object. The writing prompts also served as a basis for evaluating students' written work. To measure self-efficacy, the researchers utilized the Self-Efficacy for Writing Scale (SEWS), which was created by Bruning et al. (2012). This instrument includes 16 items beginning with 'I can', assessed through a four-level Likert scale, extending from Strongly Disagree to Strongly Agree. The items were adapted and translated into Bahasa Indonesia using a licensed version of ChatGPT. The writing self-efficacy instrument was administered solely administered to the experimental group before the post-test. For evaluating students' writing, the study applied an analytic scoring rubric covering idea development (30%), text organization (20%), syntax and grammar (20%), word choice (15%), and mechanics such as punctuation and spelling (15%), adapted from Jacobs et al. (1981). To guarantee the validity of all instruments, the researchers sought validation from both a peer reviewer and an English teacher.

Table 3. Table of instrument in which data was obtained

Instrument	***Purpose***	***Data Collected***	***Level of Measurement***
Self-Efficacy in Writing Scale	*To assess learners' writing self-efficacy levels*	*Students' agreement on statements (Likert scale)*	*Ordinal*
Scoring Rubric of Writing	*To provide a clear, consistent, and objective framework for evaluating students' writing performance.*	*Scores on descriptive writing*	*Ratio*
Writing Test (Descriptive Text)	*To assess students' descriptive writing performance*	*Students' descriptive writing scores*	*Ratio*

Data collecting technique

The data collection process consisted of the pre-test and post-test scores collected from both the experimental and control groups. To ensure scoring accuracy, two raters participated: the lead researcher and the students' English teacher. Before doing the scoring, the first rater and the second rater discussed each aspect of the writing score to have the same perception of the scoring rubric. After the treatment was done, the researchers made a copy of the learners' writing outcomes. The raters evaluated the students' writing outcomes using the scoring rubric developed by Jacobs et al. (1981). Each component of the writing was scored individually and then aggregated. The mean score for each aspect served as the basis for calculating the final scores. The same rubric was applied to assess both the pre-test and post-test compositions. To gather self-efficacy data, the researchers distributed and supervised the completion of the self-efficacy questionnaire. Printed copies of the questionnaire were provided to the students, and the responses were categorized into two groups: high self-efficacy and low self-efficacy.

Instruments validity and reliability

To verify the validity of the writing examination and the Self-Efficacy in Writing Scale (SEWS), both were systematically validated by experts. An experienced senior high school English teacher and a language assessment specialist assessed the writing prompts and grading rubric to verify content validity, which means alignment with the learning objectives for descriptive writing at the secondary education level.

The writing assessment rubric is adapted from Jacobs et al. (1981). It has five criteria: content, organisation, grammar, vocabulary, and mechanics. To maintain inter-rater reliability, all student writing samples were assessed separately by two raters: the primary researcher and the classroom teacher. Before scoring, both raters engaged in an alignment session to ensure that their score interpretations were consistent. The Cohen's Kappa statistic was used to examine inter-rater reliability. and the coefficient was $\kappa = 0.84$, indicating a high level of agreement (Landis & Koch, 1977).

To maintain meaning equivalence, all 16 items of the SEWS questionnaire were translated into Bahasa Indonesia. A TEFL educator employed expert judgment to ensure both content and face validity. Cronbach's Alpha was used to examine the internal consistency of the

SEWS instrument, which yielded an outstanding internal reliability coefficient of α = 0.89 (George & Mallery, 2019).

Data analysis technique

Students' writing scores formed the central dataset in this study, derived from pre-tests, post-tests, and writing assignments. In both tests, students wrote descriptive texts on assigned topics. To determine initial proficiency, a pre-test was carried out before to the treatment was administered. The resulting scores were analyzed to test whether statistical assumptions were satisfied. IBM SPSS Statistics 25 was used to process the data. Checks for normality and homogeneity showed that these assumptions were violated. Therefore, the researchers applied a nonparametric technique, specifically the Mann-Whitney U test.

The group participating in the experiment answered the self-efficacy questionnaires before completing the post-test. The output of this questionnaire is nominal data. The maximum score of the questionnaire is 64. The score of low self-efficacy ranges from 1 to 32 and the score of high self-efficacy ranges from 33 to 64. The responses were analyzed employing both Cronbach's Alpha and the Pearson Product-Moment Correlation to determine consistency.

There were two hypotheses in this study. These were null hypotheses and alternative hypotheses. The hypotheses were as subsequently follows.

Null hypotheses

1. There is no significantly different difference.in the writing performance of students who receive collaborative writing instruction supported by QuillBot compared to those who are taught through conventional methods. (Ho)
2. There is no statistically significant difference in writing performance between students with high self-efficacy and those with low self-efficacy when taught using QuillBot-assisted collaborative writing. (Ho)

Alternative hypotheses

1. There is a significant difference in the writing ability of students taught by collaborative writing integrated with QuillBot and those taught by using conventional ways. (Hi)

2. There is a considerable difference in the writing ability of students with high self-efficacy and students with low self-efficacy who are taught collaborative writing integrated with QuillBot. (Hi)

RESULT AND DISCUSSION

Findings

The results are presented in three sections. First, it discusses the verification of assumptions. Second, it examines the contribution of QuillBot-supported Collaborative Writing on students' writing skills, and the third part reports the comparison of writing performance across different variations in self-efficacy.

Fulfillment of assumptions of normality and homogeneity

Before conducting the independent samples t-test, it was essential to verify that the data satisfied the assumptions of normality and homogeneity. The Shapiro-Wilk test revealed that the data did not follow a normal distribution, as multiple significance values were below the 0.05 level. Furthermore, Levene's test for homogeneity of variances indicated that the data did not meet the homogeneity assumption. The significance values across different measures are 0.000 which is under the 0.05 threshold. This exposes that the variances across groups are not equal. In conclusion, the findings lead to alternative non-parametric tests to analyze differences between groups.

The effect of QuillBot-assisted collaborative writing regarding students' writing proficiency

The post-test results for both groups were examined to assess the effect of QuillBot-supported collaborative writing on students' writing performance. Descriptive statistics for the post-test scores of the control and experimental groups are displayed in Table 4 (Mann-Whitney U Rank Table) and Table 5 (Mann-Whitney U Test Statistics).

Table 4. The rank table of Mann-Whitney U test results

	Groups	*N*	*Mean Rank*	*Sum of Ranks*
Scores	*The control group's post-test score*	*21*	*17.17*	*360.50*
	The Experimental group's post-test score	*24*	*28.10*	*674.50*
	Total	*45*		

As indicated in Table 4, the experimental group recorded a greater mean rank (28.10) than the control group (17.17), implying superior average performance among the experimental participants.

Table 5. The Test Statistics Table of Mann-Whitney U Test Results

Statistics	*Value*
Mann-Whitney U	*129.500*
Wilcoxon W	*360.500*
Z	*-2.806*
Asymp. Sig. (2-tailed)	*.005*

As shown in Table 5, the Mann-Whitney U statistic is 129.500, and the Z-value is -2.806, reflecting the standardized result. The two-tailed p-value is 0.005, which falls below the 0.05 significance level. Accordingly, the null hypothesis (H_0) is dismissed, revealing that there is a significant difference between the two groups.

Writing ability comparison across self-efficacy levels

To determine whether a significant difference existed in writing performance between students with high and low self-efficacy levels under QuillBot-supported Collaborative Writing, the means of their post-test scores were compared. The results of this comparison are shown in Table 4.

Table 6. Test statistics of comparison of means of the self-efficacy in the experimental group

	WRITING SCORE
Mann-Whitney U	*3.000*
Wilcoxon W	*4.000*
Z	*-1.248*
Asymp. Sig. (2-tailed)	*.212*
Exact Sig. [2(1-tailed Sig.)]*	*.333[b]*

a. Grouping Variable: GROUP

b. Not corrected for ties.

Table 6 shows that the significance value (Asymp. Sig., two-tailed) was 0.212, which exceeds the 0.05 threshold. Therefore, the null hypothesis (H_0) was retained. This indicates that

there was no statistically significant difference in writing performance between students with high and low self-efficacy levels when taught through QuillBot-assisted collaborative writing.

Discussion

The first research question examined whether students instructed using QuillBot-assisted collaborative writing demonstrated significantly different writing performance compared to those who received traditional instruction. The post-test results revealed that the control group had a mean score of 17.17, whereas the experimental group, following the intervention, achieved a mean score of 28.10. The higher mean score attained by the experimental group suggests a significant difference between the groups, highlighting the effectiveness of incorporating QuillBot into collaborative writing activities for teaching descriptive writing in K–12 settings.

The result of this study confirms some previous research pertaining to the QuillBot implementation in the writing class. The application of online learning writing tool and their readiness to technologies, such as QuillBot affected their performance during the Collaborative Writing process (Woo et al., 2011; Chu et al., 2017; Woo et al., 2013). The use of QuillBot had positive impact on learners' self-efficacy, comprehension, and writing performance (Said & El-Garawany, 2024b). As a result, equipping learners with adequate training in QuillBot usage is vital to support the successful use of collaborative writing methods in foreign language education settings, especially in Senior High School. Related to students' familiarity with technologies, students' openness directly depends on the expectations and beliefs of parents, teachers, and institutions. Interestingly, the readiness of English teachers is also a substantial aspect of applying technology integrated with Collaborative Writing. As digital natives, students might produce a piece of text created by ChatGpt and paraphrase it with QuillBot. Hence, the English must know some AI detector tools to check plagiarism produced by Artificial Intelligence.

These findings are consistent with Amanda et al. (2023), who mentioned that learners perceived QuillBot as a beneficial aid within the writing class, assisting to improve the quality of their work and assisting them throughout the writing process. Students could use AWE tools like QuillBot to check the writing quality and revise before submitting their texts to the teacher

(Lee & Kim, 2025). This study also confirms earlier research that student who applied QuillBot in writing class had better scores than students who did not apply QuillBot in writing class (Y. Pratama et al., 2025). In addition, our results align with previous study showing that the QuillBot-assissted intervention significantly enhanced writing skill and decreased anxiety. Moreover, Shen et al. (2023) mentioned that AWE tool like Quillbot could fostered the lexical complexity in writing.

Overall, the implementation of Artificial Intelligence tools, like QuillBot, has been proved to offer some benefits in writing class. Some researchers have scrutinized the benefit of AI tools, such as decreasing the second language (L2) learner anxiety (Wang et al., 2024), personalizing teaching instruction (Zhang & Zou, 2022), providing detailed and immediate feedback (Chen et al., 2021). Hence, it indicates that the use of AI tools can improve the learners' cognitive and affective experience (Zhu & Wang, 2025).

The outcomes of this study also correspond with the concept that Collaborative Writing could improve the student's collaborative task, including micro and macro skills of writing (Lu & Kim, 2021), and writing proficiency especially in the aspect of Content, Language Use, and Organization (Alwahoub et al., 2022). Additionally, it offers an opportunity for low-skill students to learn alongside high-skill partners (Gabriele, 2007; Winskel, 2008, as cited in Anshu & Yesuf, 2022). This situation is beneficial for K12- classrooms which have different levels of writing. Throughout the writing phase, Collaborative Writing offers space for learners across all proficiency levels to learn and benefit from ideas and input appearing during the process of writing (Donato, 1988; Ohta, 1995). In addition, Collaborative Writing has the potential to improve students' proficiency in both individually written texts and jointly produced composition and fostered positive response toward the application of Collaborative Writing (Helaluddin et al., 2023; Pham, 2021). As a final point, collaborative writing provides some benefits for both strong students and weak students that exist during the process of writing from brainstorming to editing.

The collaboration and interaction during Collaborative Writing have significant roles to assist L2 learner to create a good writing result. The interactionist perspective, which consider interaction as key to learning a second language, has shaped the research on Collaborative Writing (Long, 1983; Swain, 1985, 1993). Referring to Long's (1983) interaction hypothesis

focusing on the meaning negotiation and understandable input, Swain (1985) developed the understandable output theory, that underscores the significance for both written and spoken production in the acquiring L2. Later, Swain (1993) revised this theory by the concept of "pushed out", mentioning that Collaborative Writing encourage learners of L2 to form language which is grammatically correct and comprehensible. Hence, the collaboration among peers in Collaborative Writing fosters L2 improvement through delivering correctional input, possibilities for generating modified result, and interactionally improved input (Gass & Mackey, 2006). Moreover, Collaborative Writing provides exercises that enable learners to identify the disparities in language, investigate the idea, and devote to create (Torres & Cung, 2019; Yilmaz, 2011).

The relationships and interactions among learners during the writing process in Collaborative Writing are in line with Vygotsky's sociocultural theory (Vygotsky, 1978; Le, 2021). Peer interactions during Collaborative Writing process provides Zone of Proximal Development (ZPD) that describes the gap between what a learner can achieve independently and what they are able to achieve with appropriate support or guidance. This process activates the weaker learners to learn from more capable learners during the process of composing a piece of text collaboratively. In addition, QuillBot assisted the writing process by correcting the vocabulary and grammar automatically, decreasing the cognitive pressure and enabling students to concentrate on higher-level writing skills such as maintaining coherence and structuring ideas effectively (Woo et al., 2013; Alwahoub et al., 2022).

This research further revealed that combining QuillBot with Collaborative Writing has demonstrated positive benefits for students. Before doing Collaborative Writing task, the students found difficulties in developing a descriptive text. They could find the topic easily. Unfortunately, they had difficulties generating the idea, linking it to the idea, and developing supporting arguments. They tended to struggle during the writing process. Nevertheless, the application of collaborative writing practices gradually overcame the difficulties in the writing process. During the treatment, the students worked collaboratively from the initial step to the end of the step of writing; covering brainstorming, writing the first draft, revising, and editing until submitting the final writing. The interaction during the writing process fostered the L2 language (Alghasab et al., 2019). Besides, the implementation of QuillBot also helped the

students receive feedback in the aspect of grammar and vocabulary. They tended to check the grammar and vocabulary before doing submission.

There is a consistency between our findings and other research regarding the influence of QuillBot-supported collaborative writing activities affecting students writing performance. In this research, integrating QuillBot with Collaborative Writing offered a new perspective and experience to the students while writing a descriptive text collaboratively. Mak and Coniam (2008) suggested that collaborative writing tasks should be grounded in real-life situations which helps learners see writing from a practical, real-world angle and keeps them focused on what they're writing about, not just how.

Combining Collaborative Writing and QuillBot which gave timely feedbacks made the students more confident to compose a good descriptive text. It also lessens the burden of the English teacher to provide appropriate feedback for all students in the classroom. It was also claimed that the process of Collaborative Writing enhanced the engagement and motivation during writing class. The students with low levels could learn how to write from students with high levels more focusing during collaborative writing. Additionally, the integration between QuillBot as an AI writing tool and Collaborative Writing offered a notable influence on students' writing success. In conclusion, the learners taught with the integration between QuillBot as an AI writing tool and Collaborative Writing achieved better writing compared to students instructed through traditional methods.

The second question examines whether students with higher self-efficacy differ significantly in writing ability from those with lower self-efficacy when taught using collaborative writing integrated with QuillBot. This study also showed that the senior high school students' self-efficacy level did not affect their writing ability. This outcome further supports the study by Noorhaya Sari (2021), which concluded that there is no association between writing self-efficacy and writing performance. In addition, (Binnendyk et al., 2024) says that there is a weak yet significantly beneficial connection between self-efficacy and writing performance. However, this is contradicted by some research that showed that self-efficacy is an essential aspect of learners' behaviors, actions, cognition, and competence (Bandura, 2017; Pintrich, 1999; Usher & Pajares, 2008; Pintrich & de Groot, 1990). Students

with high self-efficacy have reachable and higher goals (Prat-Sala & Redford, 2012). Besides, empirical research indicates that learners having elevated self-efficacy demonstrate sustained persistence, greater motivation, and an enhanced capability to manage challenges encountered during writing process compared to those who have diminished self-efficacy. Learners with low self-efficacy tend to exert less effort when faced with a challenging assignment (Bandura, 2017). Moreover, students who have high self-efficacy apply their metacognitive strategies when a challenging situation exists (Linnenbrink & Pintrich, 2003). Interestingly, this study suggests that students, regardless of whether they possess high or low self-efficacy, can improve their writing skills.

While QuiilBot-assisted Collaborative Writing significantly improved students' writing performance, self-efficacy levels did not demonstrate a significant statistical effect on the results. It suggests the need for a deeper exploration of mediating factors.

During this research, the use of QuillBot may have assisted to decrease students' anxiety about writing. By proving real-time feedback and non-evaluative feedback, the QuillBot use might have supported the writing process less daunting and more controllable. This benefit could be experienced by all students who exhibit high and low self-efficacy. Thus, QuillBot operates as a scaffolding mechanism, providing learners with technology-mediated guidance. Hence, it helps all students engage deeper and reach the best academic performance regardless of the level of students' self-efficacy at initial start.

Another factor to consider is the process of Collaborative Writing task itself. The collaborative activity in small groups naturally divided the responsibility. In addition, the peer interaction likely provided a supportive learning system where students have spaces to express their ideas during writing process, which may have lessened the impact of learner disparities in self-efficacy.

From a theoretical perspective, the findings of this research also align with Swain's Output Hypothesis (1985, 1995, 2000, 2005). It argues that producing language (writing and speaking) is essential for L2 acquisition. This theory focuses three main functions of output, such as noticing, hypothesis testing, and metalinguistics function, which promotes learning.

First, the output has function as noticing. On this phase, the learners identify the gaps in their knowledge while producing written or spoken language. The second function is as hypothesis testing. During this phase, the learners evaluate and adjust their gaps of linguistic rules by language production and corrective input. During the process of Collaborative Writing, the learners identify, evaluate, and adjust their gaps of linguistic rules collaboratively. The last function is as metalinguistic function. On the last stage, the learners evaluate the feedback given by peers, teachers, or AI-assisting writing tools, such as QuillBot, on language output. Then, the refine their comprehension of grammatical rules. The AI feedback and collaborative dialogue during metalinguistic (reflective) function may provide the linguistic development in writing independently regardless of students' initial self-efficacy levels.

In conclusion, the insufficient self-efficacy effects do not diminish its conceptual significance; instead, it suggests that supportive learning settings by integrating AI tools and peer collaboration can neutralize the effect of learners' initial level of self-efficacy, enabling the equitable student's involvement in writing.

While this research offers some insights, some limitation must be recognized. Firstly, this study was carried out over a relatively short intervention period. Secondly, the samples were obtained from a single location - constraining the applicability of the outcomes to other educational settings. Thirdly, the use of QuillBot may unintentionally fosters the students' dependence on AI which hinder creativity and critical analytical. Fourthly, the subject of this study are female students. Consequently, the results of this study may lack generalizability to mixed-gender or male students' educational contexts. Finally, this research focused only on the self-efficacy on the experimental group instead of investigating on control group and experimental group. Further research might focus students' anxiety, motivation, and engagement during the application of Collaborative Writing integrating with QuillBot in K-12 educational setting.

CONCLUSION AND IMPLICATION

Conclusion

Through a critical examination of the findings mentioned above, the findings indicate that integrating QuillBot-assisted Collaborative Writing into Senior High School instruction

contribute positively to students' writing proficiency, particularly in the area of descriptive writing. The students with Collaborative Writing and QuillBot in writing class could achieve better than those in the opposite group. The collaborative process during Collaborative Writing offers a space for students to finish a writing task collaboratively and it also helps students with low writing skills to learn during the process. Additionally, it is summarized that there is no notable correlation between leaners with high and low self-efficacy levels who participated in Collaborative Writing instruction integrated with QuillBot. All learners were afforded the same opportunity to enhance their writing competence. Accordingly, it is recommended that English teachers need not be overly concerned with students' self-efficacy when utilizing Collaborative Writing supported by QuillBot. Hypothetically, this experimental research offers some beneficial insights since it proves the concept that Collaborative Writing integrated with QuillBot is effective in teaching writing in K-12 classrooms.

Limitation

The researcher has already conducted an experimental study correctly. However, the results of this study might not be represented and generalized for all senior high school students. In this study, the researcher faced time constraints while conducting the research at the senior high school level due to limitation set by the school's permission. Besides, the sizes of experimental and control groups were not unequal, with the experimental group comprising more students than the control group. Another limitation is that the research subjects are all female students. The lack combination of female and male students decreases the information of self-efficacy between male and female students. In addition, for practical usage of QuillBot in the classroom, the English teacher must provide a clear guidelines and limitation. The teacher must remind the students to avoid the overuse of QuillBot as an AI-assisted writing tool to keep originality, creativity, and idea of the text.

Implication

The use of QuillBot and Collaborative Writing showed that it could help the English teacher offer interactive learning during writing process. QuillBot gives additional feedback in the classroom effectively due to the ease of QuillBot use and Collaborative Writing

provides collaborative activities during the writing process. To implement it, there are some steps to do. First, the English teacher creates some groups. Then, the topics of writing can be shared earlier before students attend the writing class. As a part of prewriting stage, the students brainstorm the topics and come to the class with some ideas. The students also need to install QuillBot on their smartphone before attending direct classroom interaction. In the classroom, learners develop their initial written drafts collaboratively and get some feedbacks from the English teacher. To receive additional feedback, the students can put the text into QuillBot. They can receive the feedback on grammar and vocabulary suggestion. Then, they can revise and edit the texts based on the teacher's feedback and QuillBot's feedback. After revising and editing the draft collaboratively2, they can submit it to the teacher.

This research also offers foundational insights for the next scholarly research into Collaborative Writing integrated with QuillBot, particularly through the discovery of other psychological dimensions. Due to the time constraints of the current intervention, future research would benefit from adopting a longitudinal design that investigate how QuillBot-assisted Collaborative Writing affects the students' writing achievement and self-efficacy over an extended duration. These studies could reveal whether the observed benefits are sustained over time and across varied instructional contexts.

In addition, subsequent investigations could profit by a mixed-methods approach, that enables researchers to collect not only quantitative results, but also learners' real experiences. The researchers could get more understanding into how learner perceive and discuss the adoption of AI-based application into their writing practices by conducting qualitative research, such as focus group discussions, interviews, or reflective journals-what the find useful, what challenges they face, and how their perspective change.

By combining these perspectives, future research can offer more comprehensive and human-focused knowledge about AI-supported writing teaching, especially in today's dynamic and diverse educational settings.

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