The Effect of Direct and Indirect Written Corrective Feedback on Accuracy and Fluency of University Students' English Writing

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Abstract

This research aimed to determine the effect of WCF (Written Corrective Feedback), direct and indirect, on overall accuracy, error types, and overall accuracy and fluency in pre-test, post-test, and delayed post-test in rewritten text. The research questions examined the potential links between the direct & indirect WFC, grammar & non-grammar errors, and standpoint of feedback for accuracy and fluency. A total of 100 English as a Foreign Language (EFL) students from the University of Pahlawan Tuanku Tambusai in Indonesia were involved in the research. The findings revealed significant variations among the three experimental groups in the proportions of both effectively and unsuccessfully rectified errors. as well as the proportions of uncorrected and deleted errors in both grammar and non-grammar categories. The cohort that received the Direct WCF had the most significant enhancement in accuracy. This study showed that offering direct WCF (written corrective feedback) can enhance participants accuracy gradually over an extended period of time (long term). Indirect written corrective feedback (WCF) can enhance participants' fluency in terms of overall word count. while direct WCF can improve participants' fluency in terms of t-units over a longer period of time.

Keywords: written corrective feedback, feedback accuracy, feedback fluency, errors type, English writing

1. Introduction

Writing in English is challenging for students learning English as a second or foreign language (L2/FL) as it requires knowledge of new writing habits and English grammar in an English-speaking culture (Hyland & Hyland, 2006). Academic Writing is an emotionally charged process, particularly for second language learners who must contend with high linguistic requirements (Langum & Sullivan, 2017). These challenges make writing one of the most challenging activities and increase students' reliance on teachers for corrections and teaching. Hence, many EFL writing teachers and researchers are concentrating their efforts on assisting L2/FL students in improving their Writing in accordance with their learning needs and course objectives (Polio & Williams, 2009).

Pointing out their errors in the target language is one of the most common strategies for helping these students with their Writing. Written Corrective Feedback (WFC) is the general term for all this teaching approach. WCF is a typical approach used by second language (L2) teachers to help their pupils improve their writing accuracy. As Truscott (1996) mentioned, WCF effectively improves L2 learners' writing skills and might be part of a learning process. Responses to linguistic errors in students' written work are referred to as WCF. As a critical aspect of L2 writing training, WCF has sparked much debate in the literature (Ferris, 2010). In addition**,** WCF is regarded as a critical condition for students' interlanguage development because it helps them "identify the difference between their interlanguage output and the target language input" and reorganize their linguistic brain processes. During the WCF study, Van Beuningen et al. (2012) stated that WCF was only presented on one or a few occasions, and depending on the scope of the input and the instance of targeted WCF, the same target error types and text type were used throughout the whole process of target WCF (Rahimi, 2019).

WCF improves learners' cognitive growth by encouraging them to communicate with others in their learning contexts. Aside from providing an overview of WCF studies published over the past four decades with an emphasis on feedback scope, this review study intends to identify and discuss unresolved difficulties related to feedback scope and make recommendations for future studies. The present review, focusing explicitly on the scope of feedback, will provide useful information to earlier syntheses about the efficacy of WCF based on quantitative research, which will benefit from the findings of this review (Truscott, 2007). As a form of help inside a student's constructivist approach, WCF may require the student to go to the next level of her cognitive development. As a result of the provision of and receipt of WCF, learners and teachers participate in social activities as well as cooperatively explore the meaning and function of language. Moreover, WCF is considered collaborative participation in educational efforts (Ahmadian & Tajabadi, 2014). Instructors have been observed to deliver several types of WCF in feedback to their student's written work (Leki, 1991), with past studies

identifying seven major WCF techniques. These engagement methods include direct, indirect, metalinguistic, focused (selected), unfocused (comprehensive), and WCF on local and global issues (Ferris & Roberts, 2001).

Attempted to study the effects of WCF from a theoretical approach, specifically in terms of the twofold contrast between accuracy and acquisition feedback (Manchón, 2011). Both theoretical and pedagogical issues influenced the direction of the investigation. Nonetheless, this research aimed to assess WCF's effect in relation to the distinction between feedback provided for accuracy and feedback aimed at acquisition to gain a better understanding of how WCF functions. In the feedback for accuracy, students participate in processing feedback, error detection, self-reflection on errors, and new output. On the other hand, feedback for acquisition is intended to promote long-term language learning by engaging students in processing feedback, error detection, self-reflection on errors, and new output.

The investigators employed the distinction in feedback pertaining to accuracy and fluency as a heuristic approach to investigate potential short-term and long-term learning advantages of Written Corrective Feedback (WCF). This approach is aligned with Norris and Ortega's differentiation between fluency and accuracy. In the following sections, we will discuss a few in-depth study strands relevant to our research, focusing on the targeted aims and the methods used.

2. Literature Review

2.1 Accuracy and Fluency Feedback

The objectives of the study are linked to the error correction debate, which is most frequently associated with Truscott (1999). Once it comes to immediate revisions, there is general agreement that WCF enhances grammatical accuracy (although there is much variation in the variables that can influence its effects). However, the empirical evidence for longer-term language-learning implications is mixed. Furthermore, Truscott & Hsu (2008) discovered that the effective reduction of errors in revised texts within an English as a Foreign Language (EFL) context did not serve as an indicator of second language (L2) development (i.e., decreased new texts errors), whereas (Van Beuningen, De Jong, & Kuiken 2012) discovered that providing unfocused feedback was identified as enhancing accuracy in a second language (L2) context, not only in the process of editing but also in subsequent pieces of writing.

Research undertaken by Simard et al. (2015) demonstrated that although the participants understood the WCF they were given, certain corrections nevertheless resulted in incorrect guesses about the goal of the correction. Additionally, there appear to be variances in the verbalizations of the participants based on the feedback they received. Biber, Nekrasova, and Horn (2011) researched to determine the impact of various WCF forms on the quality of students' Writing. The findings comprised both L1 and L2 WCF trials, which revealed that WCF had a small significant impact on writing quality, depending on the level of difficulty of the writing task.

Students studying English as a second language (ESL) were investigated by Nusrat, Ashraf, and Narcy-Combes (2019). The impact of instructor feedback on the written English accuracy of ESL students was investigated in this research. The findings imply that incorporating oral metalinguistic teacher feedback into the context of Pakistani language acquisition might help students achieve more success in their efforts to learn the English language more quickly and efficiently. Benson and DeKeyser (2019) investigated the influence of direct or metalinguistic written feedback on simple past tense and present perfect tense mistakes in the past and present perfect tense. Both experimental groups outperformed the control group, with direct feedback being more durable than metalinguistic input in one structure, the simple past tense.

In the following up research, Rahimi (2019) assessed the impact of focused versus comprehensive WCF and revision on improving writing accuracy in ESL students. The results revealed that the focused groups outperformed the comprehensive groups in minimizing their word errors at T2. However, there was no statistically significant difference between the two groups regarding revision. Furthermore, Kim et al. (2020) investigated the impact of direct and indirect WCF on the learning among high beginning-level Korean students when they collaborate on collaborative writing assignments. Direct WCF proved to be more helpful in supporting students in creating accurate Writing. However, both types of feedback proved to be effective in fostering the learning of new linguistic elements through collaborative Writing, as evidenced by the findings.

2.2 WCF and Types of Errors

This study looked at which sort of WCF, direct or indirect, resulted in greater error reduction across broad error categories (for example, grammar and non-grammar errors) and specific error types. A broad coding system (Van Beuningen et al., 2012) was used to distinguish between grammar & non-grammar errors, and a data-driven narrow coding approach was utilized (Ferris et al., 2013). Furthermore, the researchers discriminated between WCF mistakes that were effectively fixed and WCF errors that were not: uncorrected errors, successful corrections, unsuccessful corrections, and deleted errors (Van Beuningen, De Jong & Kuiken 2012).

Direct (oral) and indirect (written) feedback have been employed in error feedback studies. Furthermore, most WCF research (Lalande, 1982) distinguished between direct and indirect corrective feedback, the two frequent types of written corrective feedback. Direct WCF involves the teacher providing the correct form to the students, which is preferable for students with a low level of competence who are unable to self-correct and are unaware of what the correct form is. Ferris & Hedgcock (2014) argued that direct feedback helps to avoid confusion, reduces learners' cognitive burden, and allows them to test their hypotheses more directly.

Based on the directed nature of direct feedback, it can point to specific errors made by the learners, such as errors connected to spelling errors or any form of vocabulary or morpheme modifications. Furthermore, it can assist the student in producing the correct phonetics in a margin or frame misaligned (Ellis et al., 2008). However, indirect feedback is more effective at facilitating internalization of the form and

deepening metalinguistic knowledge processing than direct feedback (Bitchener, 2012). Additionally, indirect feedback forces students to correct flaws identified by their teachers, who do not provide the appropriate form of feedback to students (Ferris & Roberts, 2001).

3. Methodology

3.1 Research Questions

The following research questions guided this research:

1. How does WCF (direct and indirect) affect the overall accuracy of a rewritten text?
2. How does WCF (direct and indirect) affect the accuracy, specifically the type of error in the rewritten text?
3. How does WCF (direct and indirect) affect the overall accuracy in the post-test and the delayed post-test?
4. How does WCF (direct and indirect) affect the overall fluency of participants in the pre-test, post-test, and delayed post-test?

3.2 Materials and Methods

As mentioned by Bitchener & Ferris (2012), four or more tasks should be included in the design of WFC research: a pre-test, an update of the pre-test, and a delayed post-test. Participants revised a previously written text as part of this research after they received one of two forms of WCF (direct or indirect) in contrast to a control group receiving no WCF. In addition, each participant created two more texts during the research at different times after a week.

Bitchener & Ferris (2012) solved the focused–unfocused issue as well as challenges such as the interplay between error categories and kinds of WCF (direct and indirect). In this research, the researchers investigated which form of WCF (direct or indirect) produced higher error reduction across broad error categories; grammar & non-grammar errors. In this research, the researchers distinguished between effectively successful corrections, uncorrected errors, unsuccessfully corrections, and deleted errors (Van Beuningen, 2011).

3.3 Participants and Setting

The participants were 100 EFL students from the University of Pahlawan Tuanku Tambusai, Indonesia, enrolled in the course as part of their English Studies degree. Before studying at the university, they had been learning English for about 12 years, and their proficiency matched the level of a B1 Threshold-Independent User, the highest level of proficiency. The selection of this level for the study was made in order to facilitate learners engagement with and integration of the It feedback provided during the language learning session.

3.4 Instrument

The instruments used in this study are categorized as test instruments, as they support the collection of data measuring students' writing skills at various stages (pre-test, post-test, and delayed post-test). The pre-test assesses participants' initial writing abilities, covering parameters such as structure, grammar, vocabulary, and content. Subsequently, the languaging session provides an opportunity for participants to identify and comprehend errors in their own texts, requiring active engagement in the process of error identification and correction. Furthermore, it assesses participants' ability to apply feedback and reflections from the languaging session to the rewriting process, focusing on error correction and the enhancement of writing quality. Finally, the post-test and delayed post-test stages are conducted to measure participants' writing abilities after receiving feedback and engaging in the rewriting session. This includes assessments of progress in structure, grammar, vocabulary, and content.

3.5 Design and Data Collection Procedures

One intrasubject component with four possible values (pre-test, rewrite, post-test, and delayed post-test) and one intrasubject factor WCF with three possible values (unfocused direct WCF, unfocused indirect WCF, and no feedback) were employed in the design and data collection. Hence, there existed two experimental groups and a control group (CG). The experimental groups were exposed to either direct written corrective feedback (DG - direct group) or indirect written corrective feedback (IG - indirect group), whereas the control group (CG) did not receive any feedback before revising their articles.

Overall, five weeks were spent collecting information in four stages. During that period, participants wrote their first text (pre-test), received WCF (experimental groups) or no feedback (control groups), and discussed the errors present in their original texts, whether or not WCF was available for the intervention and control groups. Subsequently, they revised their initial text through the process of rewriting and ultimately composed two extra texts on distinct subjects (post-test and delayed post-test). They produced several writing contexts before making adjustments to their texts and created new ones to allow for self-reflection processes in reaction to the criticism they received.

This data collection method may have resulted in an unexpected practice effect, which the researchers were informed of. However, they had no other choice for gathering data to analyze the effects of feedback on new writing pieces. They were concerned about the possible combined influence of WCF and languaging in the data. Although no control group did not engage in languaging but get WCF, the researcher was able to dissociate the possible combined impact of WCF and languaging since there was a control group that did not engage in languaging about their errors but did receive WCF.

During the language sessions, each participant was allocated a period of 50 minutes to assess their errors and receive feedback (in the feedback groups) or to independently identify their errors and engage in reflection (in the CG - control group). According to Suzuki (2012), the following instructions were given to the participants. All three groups (DG, IG, and CG) traveled through a languaging session, this involved transcribing each error identified in the pre-test onto a sheet of paper and offering a correction (already supplied in the

feedback for the DG), an ML code (already provided in the feedback for the IG), and an ML explanation (not provided in the feedback for either of the two feedback groups).

During the rewriting session, the participants were required to find errors they recognized from the languaging session in their previous uncorrected essays to recreate their writings more accurately in the rewriting session. After revising their texts for a week, each participant ended up with a new piece of Writing. Following the post-test, all participants were required to write a new piece of writing.

3.6 Procedures for Data Coding and Analysis

Despite the highly precise coding schemes used, two reviewers (knowledgeable EFL instructors and researchers) effectively coded all errors for all coding schemes to maintain a high level of reliability (100 percent), despite appearances in applied linguistics. When raters argued, the errors were reviewed until everyone agreed. Moreover, a broad coding system on Van Beuningen et al. (2012) was used to distinguish between grammar and non-grammar errors, and a narrow coding system (Ferris et al., 2013) and partly data-driven.

The researchers devised a coding scheme based on the operationalization of depth of processing to distinguish between learners' cognitive effort when digesting the WCF they got (intervention groups) and their own self-identified errors (control groups) in terms of language (CG). A non-parametric statistical approach was used to evaluate the data because of our small sample size and non-normal data distribution. The Kruskal–Wallis tests, Mann–Whitney U, Wilcoxon Signed Rank, and Friedman tests were all used to examine the data. It was decided to utilize Kruskal–Wallis tests to examine how many mistakes and types of errors were made, and how many errors were reduced in each group in the study.

Following the confirmation that statistically significant differences existed between the three groups, the Mann-Whitney U tests were employed to ascertain if there were any statistically significant variations between the two designated groups. Friedman tests were utilized when comparing the reduction in errors produced in one group's tests to the other group's tests.

4. Result

The results of this study provide valuable insights into how the feedback influences the writing abilities of university students. Let us examine together the findings of this research to understand the contribution of corrective feedback to the accuracy and fluency in the English writing of university students.

4.1 WCF's Effect (Direct & Indirect) on the Overall Accuracy of a Rewritten Text

Table 1. Error Correction Rate in Rewritten Texts: Descriptive Statistics and Kruskal-Wallis

Category	M (SD)			Kruskal-Wallis Test	
	DG	IG	CG	H	*p*
Successful corrections	47.81 (6.03)	41.37 (3.84)	18.31 (2.64)	43.65	0.00
Unsuccessful correction	7.28 (2.35)	10.17 (1.81)	3.72 (1.00)	38.61	0.00
Uncorrected errors	40.21 (5.88)	40.48 (4.91)	64.99 (4.21)	39.57	0.00
Deleted errors	4.67 (1.58)	7.96 (1.99)	12.96 (3.45)	41.35	0.00

Table 1 presents the error correction rate in rewritten texts and indicates significant differences between the three experimental groups (DG, IG, CG) in the percentage of successful and unsuccessful corrections, as well as the percentage of uncorrected and deleted errors.

Table 2. Comparison of Error Correction Rate in Rewritten Texts across Group: Mann-Whitney

Category	DG vs. IG		DG vs. CG		IG vs. CG	
	U	*p*	*U*	*p*	*U*	*p*
Successful corrections	66.50	0.00	0.00	0.00	0.00	0.00
Unsuccessful correction	53.5	0.00	42.50	0.00	0.00	0.00
Uncorrected errors	158.0	0.69	0.00	0.00	0.00	0.00
Deleted errors	40.5	0.00	0.00	0.00	33.00	0.00

Table 2 shows that WCF (DG and IG) gave more successful corrections than CG, and Direct WCF had more successful corrections than Indirect WCF. Although WCF provides more successful corrections, it turns out that WCF also provides more unsuccessful corrections than CG. In addition, WCF had significantly less uncorrected error than CG, but there was no significant difference between different types of WCF (DG and IG). Also, direct WCF has the smallest deleted errors significantly.

4.2 WCF's Effect (Direct & Indirect) on the Accuracy, Specifically the Type of Error in the Rewritten Text

Table 3. Number of Error Type in Rewritten Text: Descriptive Statistics and Kruskal-Wallis

Category	Error Type	M (SD)			Kruskal-Wallis Test	
		DG	IG	CG	H	*p*
Successful corrections	Grammar	11.68 (1.49)	8.09 (1.35)	5.04 (1.15)	47.47	0.00
	Non-grammar	9.43 (0.94)	8.57 (0.93)	2.56 (0.29)	42.02	0.00
Unsuccessful correction	Grammar	1.08 (0.61)	2.10 (0.57)	1.05 (0.57)	21.59	0.00
	Non-grammar	2.25 (0.83)	2.01 (0.58)	0.50 (0.28)	39.87	0.00
Uncorrected errors	Grammar	9.55 (2.14)	7.40 (1.73)	14.82 (1.67)	41.72	0.00
	Non-grammar	8.61 (2.76)	9.20 (2.51)	12.30 (2.22)	17.52	0.00
Deleted errors	Grammar	1.00 (0.56)	1.07 (0.62)	2.90 (1.68)	17.53	0.00
	Non-grammar	1.05 (0.60)	2.10 (0.69)	2.52 (0.95)	23.07	0.00

The results of the number of error types in rewritten text in Table 3 reveal significant differences between the three experimental groups (DG, IG, CG) in successful and unsuccessful corrections, with the DG group being the highest. There is also a significant difference in the percentage of uncorrected and deleted errors in terms of grammar and non-grammar.

Table 4. Comparison of Number Error Type in Rewritten Text: Mann-Whitney

Category	Error Type	DG vs. IG		DG vs. CG		IG vs. CG	
		U	*p*	*U*	*p*	*U*	*p*
Successful corrections	Grammar	9.50	0.00	0.00	0.00	14.50	0.00
	Non-grammar	91.00	0.01	0.00	0.00	0.00	0.00
Unsuccessful correction	Grammar	43.5	0.00	193.0	0.86	40.50	0.00
	Non-grammar	142.0	0.38	0.00	0.00	0.00	0.00
Uncorrected errors	Grammar	81.5	0.00	5.00	0.00	0.00	0.00
	Non-grammar	152.0	0.56	62.0	0.00	68.5	0.00
Deleted errors	Grammar	157.5	0.68	65.0	0.00	65.5	0.00
	Non-grammar	46.5	0.00	39.0	0.00	150.5	0.28

Table 4 compares the number of error types in rewritten text. It shows that successful corrections of grammar and non-grammar errors WCF were significantly higher than CG. However, DG provides better successful correction than IG, both in terms of grammar and non-grammar. In unsuccessful correction of grammar errors, DG was significantly better than IG but only slightly different from CG. As for non-grammar, WCF was significantly superior to CG. In terms of uncorrected grammar and non-grammar errors, WCF was significantly superior to CG. Moreover, IG has significantly more uncorrected grammar errors than DG. While, in deleted grammar errors, WCF had significantly fewer deleted grammar errors than CG. As for non-grammar, DG had significantly fewer deleted grammar errors than IG and CG.

4.3 WCF's Effect (Direct & Indirect) on the Overall Accuracy in the Post-Test and Delayed Post-Test

Table 5. Percentage of Errors: Analysis of Descriptive Statistics and Kruskal-Wallis

Test	M (SD)			Kruskal-Wallis Test	
	DG	IG	CG	H	*p*
Pre-test	12.76 (1.49)	12.77 (1.50)	13.26 (1.25)	1.49	0.47
Post-test	11.31 (1.35)	10.36 (1.35)	10.91 (1.52)	3.80	0.15
Delayed post-test	8.44 (0.95)	9.61 (1.61)	9.71 (1.54)	8.32	0.02

When viewed from the type of test, Table 4 reveals that the percentage of errors in the delayed post-test was significantly different between the three experimental groups (DG, IG, CG). Participants receiving direct WCF statistically had a lower percentage of error than those receiving indirect WCF and those not receiving WCF (DG vs. IG: U = 97.00, p = 0.02; DG vs. CG: U = 100.0, p = 0.01). On the other hand, based on each treatment group, the results of Friedman's test showed that three groups had a significant difference in the error percentage in the pre-test, post-test, and delayed post-test: DG, $X^2_F = 35.71$, $p = 0.00$; IG, $X^2_F = 14.73$, $p = 0.00$ CG, $X^2_F = 26.91$, $p = 0.00$) based on Figure 1.

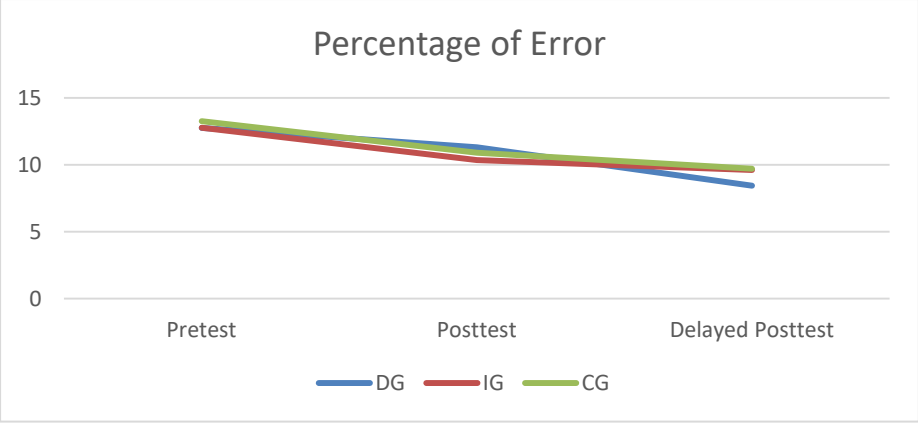

Figure 1. Average Percentage of Error across Time

Table 6. Reduction of Percentage of Error Across Tests within Groups: Wilcoxon

Pair	DG		IG		CG	
	Z	*p*	*Z*	*p*	*Z*	*p*
Pre-test – Post-test	-3.65	0.00	-3.20	0.00	-3.55	0.00
Pre-test – Delayed Post-test	-3.83	0.00	-3.48	0.00	-4.01	0.00

The results in Table 6 show a significant increase in the participants' accuracy over time, from pre-test to post-test and from pre-test to delayed post-test ($p<0.05$). An increase in accuracy occurred in participants who obtained WCF (DG and IG) and those who did not (CG). The highest increase in accuracy occurred in the group of participants who received the Direct WCF. This shows that administering WCF,

especially direct WCF, can improve participant accuracy over time (long term).

4.4 WCF's Effect (Direct & Indirect) on the Overall Fluency of Participants in the Pre-Test, Post-Test, and Delayed Post-Test

a. Overall words

Table 7 illustrates the overall words based on the type of test. It indicates that the number of words in the post-test and delayed post-test was significantly different between the three experimental groups (DG, IG, CG). In the post-test, participants receiving indirect WCF had significantly greater word count than those receiving direct WCF and those not receiving WCF (DG vs. IG: $U = 84.0$, $p = 0.01$; IG vs. CG: $U = 92.5$, $p = 0.01$). In the delayed post-test, the participants with indirect WCF had the largest number of words. While, participants obtaining direct WCF had significantly lower word counts than those without WCF (DG vs. IG: $U = 84.0$, $p = 0.01$; IG vs. CG: $U = 92.5$, $p = 0.01$).

Table 7. Overall Words: Analysis of Descriptive Statistics and Kruskal-Wallis

Test	M (SD)			Kruskal-Wallis Test	
	DG	IG	CG	H	*p*
Pre-test	118.2 (63.02)	120.6 (56.88)	119.8 (39.43)	0.06	0.97
Post-test	90.0 (38.38)	125.1 (25.06)	99.0 (29.95)	9.78	0.01
Delayed post-test	143.6 (54.37)	204.8 (39.46)	181.7 (30.37)	13.98	0.00

Figure 2 also depicts the Friedman test results, showing that the three groups have significantly different overall words, both decreasing and increasing in the pre-test, post-test, and delayed post-test in each treatment group: DG, $X^2_F = 9.58, p = 0.01$; IG, $X^2_F = 18.78, p = 0.00$ CG, $X^2_F = 32.00, p = 0.00$).

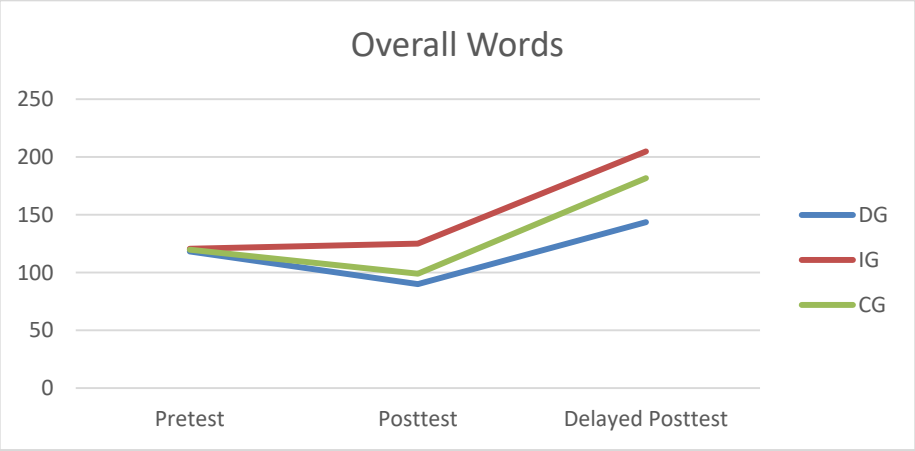

Figure 2. Overall Words across Time

Table 8. Improvement of Overall Words Across Time within Groups: Wilcoxon

hhh	DG		IG		CG	
	Z	*p*	*Z*	*p*	*Z*	*p*
Pre-test – Post-test	-2.36	0.02	-0.28	0.77	-1.99	0.04
Pre-test – Delayed Post-test	-1.61	0.11	-3.46	0.00	-3.98	0.00

Table 8 showed that the overall words from pre-test to post-test in participants receiving Direct WCF and those not receiving WCF significantly decreased ($p<0.05$). Meanwhile, the overall words of participants receiving Indirect WCF increased but not significantly. There was a significant increase in overall word from pre-test to delayed post-test in participants who received Indirect WCF and those who did not (CG). This shows that giving Indirect WCF can increase the number of words that participants can compose over time (long term).

b. T-Units

Based on the type of test, the t-units in the delayed post-test showed significant differences between the three experimental groups (DG, IG, CG), as seen in Table 9. Participants who obtained WCF statistically had lower t-units than those who did not (DG vs. IG: $U = 143.5$, $p = 0.40$; DG vs. CG: $U = 112.0$, $p = 0.02$; IG vs. CG: $U = 75.0$, $p = 0.00$).

Table 9. T-Units: Analysis of Descriptive Statistics and Kruskal-Wallis

Test	M (SD)			Kruskal-Wallis Test	
	DG	IG	CG	H	*p*
Pre-test	8.53 (3.63)	9.61 (3.52)	9.38 (3.52)	1.01	0.61
Post-test	9.05 (3.06)	8.28 (2.72)	11.3 (8.72)	2.39	0.30
Delayed post-test	11.2 (3.75)	10.28 (3.72)	14.0 (1.82)	11.45	0.00

The Friedman test results show that participants who received direct WCF and those who did not (CG) had significantly different t-units, both decreasing and increasing, on the pre-test, post-test, and delayed post-test: DG, $X^2_F = 8.24, p = 0.02$; IG, $X^2_F = 1.94, p = 0.38$; CG, $X^2_F = 26.88, p = 0.00$), as illustrated in Figure 3.

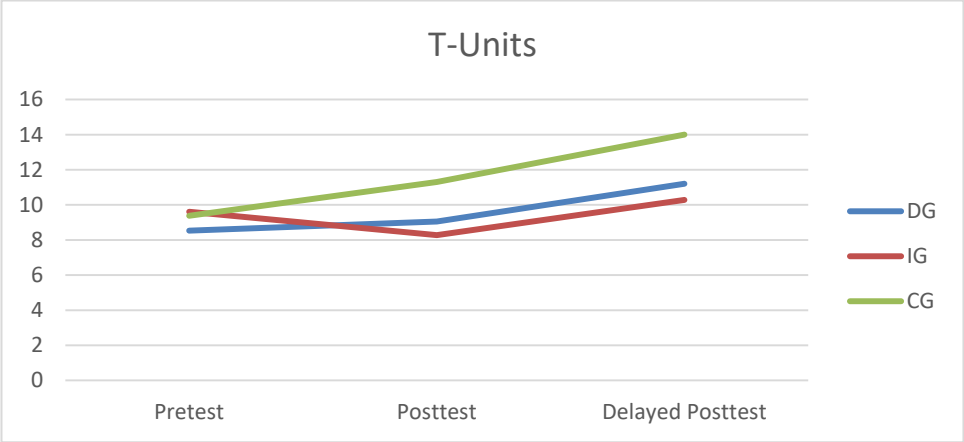

Figure 3. T-Units across Time

Table 10. Improvement of T-Units Across Time within Groups: Wilcoxon

Pair	DG		IG		CG	
	Z	*p*	*Z*	*p*	*Z*	*p*
Pre-test – Post-test	-0.51	0.61	-1.10	0.27	-1.05	0.29
Pre-test – Delayed Post-test	-2.49	0.01	-0.59	0.55	-3.93	0.00

Table 10 shows that the t-units from the pre-test to post-test of the participants receiving Direct WCF and those not receiving WCF increased but not significantly. Meanwhile, it was decreased for the participants who received Indirect WCF. There was a significant increase in t-units between the pre-test and delayed post-test in participants who obtained Direct WCF and those who did not (CG). The increase in t-units in participants who did not receive WCF was greater than that in participants who received Direct WCF. This shows that implementing Direct WCF and without WCF can increase participants' t-units over time (long term).

c. Sentence Counts

When viewed from the type of test, the sentence counts in the pre-test, post-test, and delayed post-test showed significant differences between the three experimental groups (DG, IG, CG), as presented in Table 11. In the pre-test, participants receiving direct WCF statistically had lower sentence counts than those receiving indirect WCF and not receiving WCF (DG vs. IG: $U = 0.00, p = 0.0$; DG vs. CG: $U = 81.5, p = 0.00$). In the post-test, participants receiving direct WCF statistically had lower sentence counts than those receiving indirect WCF and not receiving WCF (DG vs. IG: $U = 0.00, p = 0.0$; DG vs. CG: $U = 0.00, p = 0.00$). In the delayed post-test, participants with WCF had lower sentence counts than those without WCF (DG vs. CG: $U = 00.00, p = 0.0$; IG vs. CG: $U = 102.50, p = 0.02$).

Table 11. Sentence Counts: Analysis of Descriptive Statistics and Kruskal-Wallis

Test	M (SD)			Kruskal-Wallis Test	
	DG	IG	CG	H	*p*
Pre-test	9.51 (1.90)	16.01 (1.67)	14.30 (4.34)	24.14	0.00
Post-test	5.50 (0.56)	10.81 (4.03)	13.41 (0.81)	37.77	0.00
Delayed post-test	10.28 (2.61)	9.52 (2.78)	7.94 (1.89)	12.73	0.00

Concerning each treatment group, the Friedman test results show that the three groups have significantly different sentence counts, both decreasing and increasing, on the pre-test, post-test, and delayed post-test: DG, $X^2_F = 23.47, p = 0.00$; IG, $X^2_F = 28.78, p = 0.00$; CG, $X^2_F = 26.48, p = 0.00$), as illustrated in Figure 4.

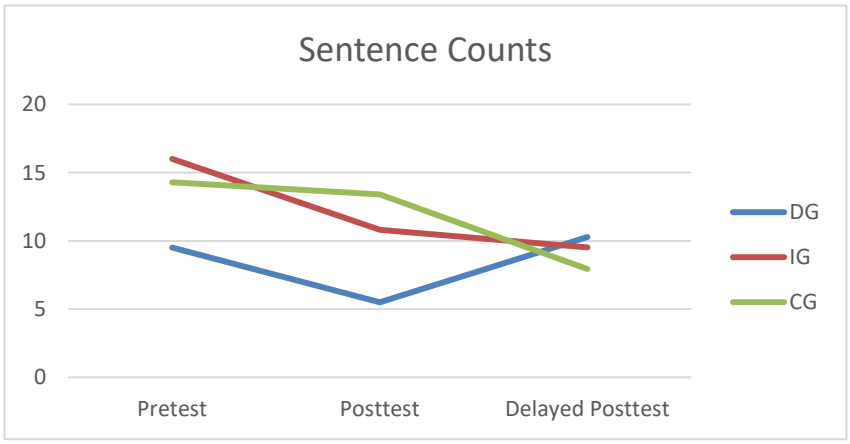

Figure 4. Sentence Counts Across Time

Table 12. Improvement of Sentence Counts Across Time within Groups: Wilcoxon

Pair	DG		IG		CG	
	Z	*p*	*Z*	*p*	*Z*	*p*
Pre-test – Post-test	-3.82	0.00	-3.72	0.00	-0.95	0.34
Pre-test – Delayed Post-test	-0.95	0.34	-3.72	0.00	-3.77	0.00

Table 12 presents the improvement of sentence counts. It shows that the sentence counts between the pre-test and post-test in participants obtaining WCF significantly decreased. In addition, there was a significant decrease in sentence counts from pre-test to delayed post-test in participants receiving indirect WCF and those who did not receive WCF (CG). This shows that either with WCF or without WCF, the sentence counts decrease over time (long term).

Among the three fluency indicators: overall words, t-units, and sentence count, only overall words and t-units showed increased participant fluency after obtaining WCF. The provision of indirect WCF can increase the fluency of participants in terms of overall words, while the provision of direct WCF can increase the fluency of participants in terms of t-units in the long term.

5. Discussion

The first research question investigated the WCF's effect (direct and indirect) on the overall accuracy of the rewritten text. The results revealed that the proportion of successful and unsuccessful corrections, as well as the percentage of uncorrected and deleted errors, substantially varied across three experimental groups (DG, IG, CG). WCF (DG and IG) had a greater proportion of successful corrections than CG, and direct WCF had a higher percentage of effective corrections than indirect WCF.

WCF has a higher rate of successful corrections than CG; it also has a higher rate of unsuccessful corrections. There was a substantial difference between WCF and CG in terms of uncorrected error but no significant difference between the different forms of WCF (DG and IG). Furthermore, direct WCF has the smallest deleted errors. It was observed that the successful corrections of updated texts in an EFL context were not a predictor of L2 development (i.e., fewer errors in new texts). However, successful corrections of revised texts in an EFL setting were predictors (Truscott & Hsu, 2008). Moreover, Van Beuningen et al. (2012) showed that providing unfocused feedback increased accuracy in Writing, not only while revising but also when developing new writing pieces.

The second research question was about the WFC's effect (both direct and indirect) on the accuracy, specifically, the sort of mistake introduced into the rewritten text. The findings revealed statistically significant differences between the three experimental groups (DG, IG, CG) in terms of successful and failed repairs, as well as the proportion of uncorrected and deleted errors, both in grammar and non-grammar. Furthermore, when it came to successful fixes of grammar and non-grammar problems, WCF outperformed CG by a wide margin. On the other hand, DG delivers more successful corrections than IG in terms of grammar and non-grammar correction.

In unsuccessful corrections of grammar errors, DG was significantly better than IG but only slightly different from CG. As for non-grammar, WCF was significantly superior to CG. In terms of uncorrected grammar and non-grammar errors, WCF was significantly superior to CG. Furthermore, IG has a higher percentage of uncorrected grammatical errors than DG. On the other hand, WFC had significantly more deleted grammatical errors than CG in this category. In terms of non-grammatical errors, DG had significantly fewer than IG and CG. The following four WCF conditions were investigated: corrective, underlined, and discussion (underlining errors and providing error codes), description (provided error codes without notifying learners where the errors occurred), and simply highlight (underlining errors without delivering error codes) (Chandler, 2003).

Specifically, the data demonstrated that providing direct and indirect feedback was more efficient in reducing learner errors than just mentioning the categories of errors. The most effective of the four feedback forms for producing precise changes were direct correction, which was the most common (i.e., correct uptake). Similarly, Van Beuningen et al. (2012) discovered that direct feedback had a stronger impact on both short-term and long-term improvements in correctness in rewritten texts.

The third research question addressed the WCF's effect (direct and indirect) on overall accuracy in the post-test and delayed post-test. The results indicated that the percentage of errors was significantly different between the three experimental groups (DG, IG, CG) in the delayed post-test. Participants experiencing direct WCF had a lower rate of error than those receiving indirect WCF or not given WCF. Moreover, there was a significant increase in the participants' accuracy over time, from pre-test to post-test and from pre-test to delayed post-test. The participants receiving WCF (DG and IG) and those who did not both improved their accuracy (CG). There have been studies that show that teacher error feedback is no more effective than content-related comments or no feedback in developing accuracy in L2 student writing (e.g., Kepner (1991); Polio et al., (1998); and Semke (1984), but these studies need to be looked into further. According to Kepner (1991), college students who got surface-level error correction produced fewer errors in their journals than those who got message-related remarks. However, the students were not required to do anything with the teacher's corrections. The lack of effect of error correction on accuracy and negative effect on fluency found by Semke (1984) may not be fully related to the different treatment approaches but rather to disparities in the amount of writing practice.

The last research question addressed the WCF's effect (direct and indirect) on the overall fluency in the pre-test, post-test, and delayed post-test. According to the results, the total number of words in the post-test and the delayed post-test demonstrated a statistically significant difference between the three experimental groups (DG, IG, CG). Furthermore, the Friedman test findings from each treatment group demonstrate that they had substantially different total words, decreasing and increasing in the pre-test, post-test, and delayed post-test compared to the other groups. This shows that giving Indirect WCF can increase the number of words composed by participants over time (long term). While in the t-units, it can be seen that the delayed post-test showed significant differences between the three experimental groups (DG, IG, CG).

There was a significant increase in t-units from pre-test to delayed post-test in participants who received Direct WCF and those who did not (CG). This shows that giving Direct WCF and without WCF can increase participants' t-units over time (long term). In addition, there was a significant decrease in sentence counts from pre-test to delayed post-test in participants receiving indirect WCF and those who did not (CG). This shows WCF or not; the sentence counts always decrease over time (long term).

6. Conclusion

Based on the findings of this research, several conclusions can be drawn. Written Corrective Feedback (WCF), whether in direct or indirect form, positively impacts the overall accuracy of the rewritten text. The proportion of successful corrections is higher in the experimental groups (DG and IG) compared to the control group (CG), with direct WCF showing a more effective correction percentage than indirect WCF. Significant differences exist in both successful and unsuccessful corrections between the experimental groups (DG and IG) and the control group (CG), in both grammar and non-grammar categories. Particularly, direct WCF demonstrates superior performance in correcting grammar and non-grammar errors compared to the control group and indirect WCF.

There is a significant difference in error percentages between the experimental groups (DG and IG) and the control group (CG) in the delayed post-test. Receiving direct WCF contributes to a lower error rate compared to indirect WCF or no WCF. The total number of words in the post-test and delayed post-test shows a significant difference between the experimental groups (DG and IG) and the control group (CG). Indirect WCF appears to increase the number of words produced by participants over time (long term), while both direct WCF and no WCF increase the participants' t-units over time.

Previous studies suggest that teacher error feedback is no more effective than content-related comments or no feedback in developing accuracy in second language (L2) student writing. Further research is crucial to understanding the effects of feedback on accuracy and fluency in writing, involving a balanced amount of writing exercises. Overall, the findings of this research support the importance of both direct and indirect feedback in improving the accuracy and fluency of student writing in the context of a second language (L2). Direct WCF, in particular, significantly contributes to error correction and the long-term development of writing skills.

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Authors contributions

M. plays a pivotal role in the design and execution of the research, as well as data analysis, ensuring the reliability and validity of the findings. S.E. provides critical insights in the problem formulation stage and the design of the research methodology. U.R. is actively involved in data collection and statistical analysis. On the other hand, B.H.W. contributes theoretical insights and in-depth literature knowledge, providing substantial support in structuring and writing the article.

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The author affirms that there are no apparent conflicts of interest, either financial or personal, that could be perceived as influencing the findings presented in this paper.

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Appendix A: Number of Error Type in Rewritten Text

Category	Error Types
Successful Corrections	Grammar Nongrammar
Unsuccessful Corrections	Grammar Nongrammar
Uncorrected Errors	Grammar Nongrammar
Deleted Errors	Grammar Nongrammar