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The Effect of Indirect and Metalinguistic Corrective Feedback on EFL Writing Accuracy in a Virtual Learning Environment: A Mixed-Methods Study

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Abstract. This study investigates the impact of two types of indirect written corrective feedback—indirect corrective feedback (ICF) and indirect metalinguistic corrective feedback (IMCF)—on the development of grammatical accuracy in English as a foreign language (EFL) writing in a virtual learning environment. A mixed-method quasi-experimental design was implemented with 60 undergraduate students distributed across two experimental groups (one receiving ICF and one receiving IMCF) and a control group that received general written comments. Data were collected through a pre-test, post-test, and delayed post-test, five writing tasks completed across the academic semester, and reflection journals. The quantitative analysis focused on error reduction and accuracy improvement across measurement points, while the qualitative analysis examined student perceptions through thematic content analysis of journal entries. Results indicate that IMCF led to greater grammatical accuracy and more effective error repair than non-metalinguistic ICF. Students in both experimental groups demonstrated improvement in self-correction ability and sustained gains at the delayed post-test stage. Qualitative findings reveal that students found metalinguistic feedback to be more beneficial for long-term writing development, though some reported difficulty in interpreting it. These findings suggest that indirect corrective feedback incorporating metalinguistic information promotes self-regulated learning and grammatical accuracy in second-language writing. The findings provide empirical support for the use of structured indirect feedback for encouraging autonomous learning and facilitating sustained grammatical acquisition in virtual EFL writing.

Keywords: indirect written corrective feedback; metalinguistic feedback; grammatical accuracy; EFL writing; virtual learning environment

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1. Introduction

Grammatical accuracy in L2 writing has been a central theme for years and a priority in second language acquisition research and English as a foreign language (EFL) pedagogical practice. Decades of debate about whether written corrective feedback (WCF) fosters accuracy development have provided increasingly stronger evidence in support of WCF as a helpful instructional method (Ellis, 2008; Ferris, 1999; Sheen, 2011). In the landscape of WCF research, indirect strategies – particularly those that prompt learners to identify and repair their own errors – have emerged as especially promising for fostering self-regulated learning and durable grammatical improvement (Ferreira, 2006, 2007; Hyland & Hyland, 2006). With this line of research, the study examines how indirect corrective feedback (ICF) and indirect metalinguistic corrective feedback (IMCF) differentially affect grammatical accuracy in a university EFL writing context.

As virtual learning environments (VLEs) have become more widespread in higher education, they have started to reshape how WCF is delivered and studied. As writing instruction increasingly migrates to digital platforms, questions arise about whether feedback strategies that have proven effective in face-to-face contexts retain their effectiveness in computer-mediated settings, and whether the features of VLEs, such as enhanced visual salience, asynchronous delivery and consistent access to feedback, could change how learners process and respond to corrective information (Ene & Upton, 2014; Ortiz & Ferreira, 2014). The expansion of online instruction in Latin American universities, which had been accelerated by the COVID-19 pandemic, has made this question particularly pressing for practitioners in the region (Oportus-Torres et al., 2024).

Although scholars have investigated the effectiveness of WCF, gaps remain. First, the comparative efficacy of ICF and IMCF in VLEs, such as learning management systems (LMS), remains relatively unexplored, especially in the Chilean university context. Second, the qualitative aspect of the learner experience (how students perceive, process, and act upon different types of feedback) has received comparatively little attention in quantitative outcome studies (Mamad & Vigh, 2024). Third, the relationship between WCF type and self-regulated learning processes in virtual EFL writing courses constitutes an understudied area that has become more relevant as online instruction has expanded. To explore these gaps, this study adopted a mixed-methods approach that combined measures of error reduction with an analysis of students' reflection journals.

The study was guided by the following research objectives: 1) To evaluate the effects of ICF and IMCF on grammatical accuracy in EFL writing tasks in a VLE; and 2) To examine student perceptions of corrective feedback strategies and their role in the writing and learning process. The findings offer evidence that could inform both research and pedagogical practice in EFL writing instruction and contribute to the design of feedback practices in technology-mediated language learning contexts.

In addressing these objectives, this study makes three specific contributions to the field. First, it provides empirical evidence of the differential effectiveness of ICF

and IMCF delivered exclusively within an LMS (Canvas), thereby addressing a gap in platform-specific feedback research in higher education. Second, it extends understanding of how metalinguistic feedback activates self-regulated learning processes in virtual EFL writing, by linking feedback type to Zimmerman's (2000) self-regulated (SRL) cycle. Third, it contributes context-specific evidence from a Chilean university EFL setting, where the rapid expansion of online instruction has outpaced empirical research on effective digital feedback design.

2. Literature Review

2.1 Writing in a Foreign Language: Accuracy and the Textual Microstructure

This study is situated in the field of EFL teaching and learning, with a specific focus on L2 writing by native speakers of Spanish. Van Dijk and Kintsch's (1983) model of text comprehension proposes that written texts are organized across three levels: microstructure, macrostructure, and superstructure. The microstructure corresponds to the local and surface-level elements that render a text cohesive by attending textual micro-aesthetics and linguistic precision, the level at which the present study was primarily concerned (Kloss et al., 2020).

One persistent difficulty in foreign language writing is the level of grammatical inaccuracy found in learner texts, which manifests in the errors produced during writing tasks—particularly at the level of interlanguage (Pardo, 2020). Interlanguage may be defined as the learner's own transitional and developing linguistic system, which emerges from the interaction between the L1 and the target language during the acquisition process (Corder, 1967). The teacher's role is to respond to learner errors in ways that support this developmental process and facilitate attainment of target-language proficiency.

2.2 Errors and Slips in Foreign Language Acquisition

Kotz and Ferreira (2013, p. 221) distinguish learner errors, which reflect a "lack of linguistic competence," from slips, which are "the product of fatigue, stress, or lack of concentration." Slips do not require targeted intervention, because learners possess the competence to self-correct them. Errors, in contrast, tend to be systematic and unrecognized by the learner and, therefore, cannot be self-corrected (Corder, 1971). Ferris (2013) argues that the teacher's task is to focus on high-frequency systematic errors that recur across student discourse.

Regarding the way correction should be provided, several scholars (Harmer, 2001; Krashen, 1985; Krashen & Terrell, 1983) agree that correction should be delivered subtly and discreetly, given the potential negative consequences for affective variables such as anxiety and motivation. Ferris and Roberts (2001) report that grammatical errors may function as distractors and stigmatize the writer's text, which underscores the pedagogical necessity of supporting learners in improving their accuracy.

2.3 Written Corrective Feedback: The Debate

The effectiveness of WCF as a pedagogical tool for promoting grammatical accuracy has been the subject of sustained debate (Ferris, 1999, 2004, 2006; Krashen, 1985; Truscott, 1996, 2007). Truscott (1996) argues that error correction in L2 writing is fundamentally ineffective and potentially harmful; they

subsequently claim that WCF fosters only "pseudo-learning" by developing self-editing skills rather than genuine grammatical competence (Truscott, 2007; Truscott & Hsu, 2008). In response, Ferris (1999) maintains that empirical evidence supports the benefits of WCF, which is a position supported by a growing body of research (Chaudron, 1977; Ellis, 2008; Ferreira, 2006, 2007; Hyland & Hyland, 2006; Lyster & Ranta, 1997; Sheen, 2011). Sheen's (2007) study with 91 adult EFL learners found that both direct WCF and direct WCF with metalinguistic explanation significantly outperformed a no-feedback control group at the immediate post-test. Other recent studies have converged on support for WCF efficacy (Kloss et al., 2020; Kloss & Quintanilla, 2022; Ortiz, 2016).

Recent evidence strengthens the case for WCF while refining our understanding of its parameters. Biber et al. (2011) synthesized 23 studies and found a moderate overall effect for written feedback on writing development, and Kang and Han (2015), analyzing 21 primary studies, confirm that WCF leads to measurable accuracy gains in L2 writing. Importantly, Kang and Han found that efficacy is mediated by contextual variables such as learner proficiency, instructional setting, and writing genre, suggesting that, while the broad effectiveness of WCF is now well-supported, the conditions of the feedback intervention remain decisive.

2.4 Indirect and Metalinguistic Corrective Feedback Strategies

A consistent finding in the WCF literature is that indirect feedback strategies—those prompting learners to self-repair rather than providing the correct form directly—tend to be more effective for targeted grammatical forms than direct correction (Ellis, 2011; Ferreira, 2006, 2007; Hyland & Hyland, 2006; Sheen, 2011). Ferreira's (2007) experimental study on WCF in computer-assisted language learning found that strategies eliciting self-correction (metalinguistic cues or elicitations) were significantly more effective than direct correction strategies. IMCF occupies a distinctive position in this landscape: Rather than providing the correct form or simply indicating error location, it supplies the learner with a brief grammatical description or error code specifying the nature of the error, without resolving it.

This approach requires learners to engage cognitively with the underlying grammatical rule, a requirement that is theorized to support deeper processing and longer-term retention (Ellis, 2008; Sheen, 2011). Kloss and Quintanilla (2022) demonstrated the effectiveness of metalinguistically focused WCF on information-structuring connectors in a Chilean university context and found a significant decrease in errors for the metalinguistic group at both post-test and delayed post-test; direct feedback showed a reduction without statistical significance. These findings are consistent with Kloss et al. (2020), who found that, after receiving indirect corrective feedback on narrative academic genres, novice university writers showed significant error reduction from first to second draft.

The theoretical rationale for the effectiveness of IMCF is grounded in Schmidt's (1990, 1994) noticing hypothesis, which holds that conscious attention to form is a necessary condition for acquisition. IMCF is particularly well positioned to activate this noticing process: By identifying the nature of an error without resolving it, it directs learners' attention explicitly to the target form while

requiring active cognitive engagement to generate the correction. This combination of directed attention and learner-generated repair is theorized to produce deeper encoding than either direct correction, which eliminates the need for cognitive processing or non-metalinguistic indirect feedback, which may fail to focus attention on the specific linguistic issue involved (Ellis, 2008; Sheen, 2011).

2.5 Focused Versus Unfocused Corrective Feedback

Focused WCF refers to feedback that targets specific grammatical forms rather than all errors in a text. In contrast, unfocused WCF addresses all or most error types present in a learner's writing without pre-selecting specific categories for treatment (Ellis, 2008). While some researchers define focused WCF as targeting a single grammatical form (Sheen et al., 2009), others adopt a broader definition that encompasses a limited set of pre-selected error categories identified as high-frequency and treatable in the learner population under study (Ellis, 2008; Ferris, 2013).

In line with this distinction, the literature suggests that focused feedback tends to be more effective than unfocused feedback for the acquisition of those specific forms (Ellis, 1997; Ferreira, 2006, 2007; Sheen, 2011). Sheen et al. (2009) compared focused WCF (targeting only articles), unfocused WCF, a no-treatment control, and a writing practice group in a study with 80 intermediate EFL learners. While both WCF groups outperformed the control and practice groups on immediate measures, only the focused group maintained a significant advantage at the delayed post-test; these findings were replicated by Sheen (2007) and Ortiz (2016). However, there is a recognized limitation to focused feedback: Errors outside the targeted categories go unaddressed, a tension that must be weighed against the documented advantages for acquisition of the selected forms (Ellis, 2008; Ferris, 2013).

The present study follows the broader definition of focused feedback, targeting three error categories identified as most frequent in participants' pre-test writing: article use, preposition use, and punctuation. These forms were selected not only for their recurrence but also because of their treatability—that is, they are sufficiently rule-governed for learners to self-correct once the error has been identified (Ferris, 2013).

2.6 Student Perceptions of Written Corrective Feedback

Fewer studies have examined the qualitative dimensions of WCF from the learners' perspective, despite growing recognition that student perceptions play a central role in whether and how feedback is acted upon. Rowe and Wood (2008) found that students valued feedback and expressed clear preferences for explanatory over purely corrective responses, while Gamlem and Smith (2013) identified dialogic feedback and the opportunity to act on it as key factors shaping perceptions of quality. In EFL writing contexts, Mohammad and Rahman (2016) found that most students preferred feedback that both identified errors and provided explanatory comments, which aligns more closely with metalinguistic than with purely indirect approaches, and Jahbel et al. (2020) confirmed strong student preferences across all WCF types in a Libyan EFL context.

More recently, Kloss and Quintanilla (2024), surveying 202 ESL learners in a Chilean higher education context, found that students associated their understanding of teacher feedback directly with its effectiveness in reducing grammatical errors, thereby underscoring the pedagogical relevance of metalinguistic information in feedback design. In higher education EFL/ESL contexts, Mamad and Vigh (2024) conducted a systematic review that synthesized 30 empirical studies, which revealed that learner perceptions of WCF are highly context-dependent and influenced by prior experiences, proficiency level, and feedback type received. Crucially, it identified a recurring mismatch between student preferences for explicit feedback and teachers' tendency to use indirect approaches—a tension directly relevant to the qualitative findings of the present study.

2.7 Self-Regulated Learning and WCF in EFL Contexts

SRL, that is, the capacity of learners to set goals, monitor their performance, and regulate their learning strategies in response to feedback (Zimmerman, 2000), has been identified as a key mediating variable between WCF provision and writing development. Specifically, Oportus-Torres et al. (2024) found that purposeful instruction in SRL strategies significantly increased both self-regulation and engagement levels of EFL undergraduate students at a Chilean university during emergency remote teaching. These findings emphasize the importance of designing instructional interventions that explicitly support metacognitive awareness, particularly in VLEs where learner autonomy is critical in the absence of immediate face-to-face interaction.

The connection between WCF and SRL is particularly salient in indirect feedback approaches. When learners receive IMCF, they are required to engage in the forethought and self-reflection phases of Zimmerman's (2000) SRL cycle by identifying the nature of their error, consulting grammatical knowledge, and monitoring whether their revision successfully addresses the feedback. This process of active self-correction is theorized to promote deeper encoding of grammatical rules and greater transfer to new writing tasks (Ellis, 2008; Ferreira, 2007).

2.8 WCF in Virtual Learning Environments

The growing integration of information and communications technology in L2 writing instruction has created new possibilities for WCF provision. Ene and Upton (2014, p. 80) report that "research on electronic feedback in second language writing is scarce, despite the increasingly widespread use of computers in second language writing classes." Studies that examined WCF in virtual environments report consistently positive outcomes. Ortiz and Ferreira (2014) found that indirect metalinguistic feedback in a wiki environment significantly outperformed direct metalinguistic feedback, and that participants valued the modality.

Other studies (Erice & Ertaş, 2011; Saeedi & Meihami, 2015) demonstrate that students receiving corrective feedback via an electronic portfolio showed greater writing improvement than those receiving feedback through paper-based portfolio. Evidence also suggests that online delivery promotes more frequent text

revision and that the visual features of computer-mediated environments may facilitate noticing feedback (Liu & Sadler, 2003; Qi & Lapkin, 2001).

In this broader VLE context, learning management systems such as Canvas have emerged as particularly relevant platforms for WCF delivery in higher education, by offering asynchronous feedback provision, persistent access to comments, and institutional integration that supports sustained engagement with written feedback across multiple tasks (Ene & Upton, 2014). Despite the expansion of LMS-based writing instruction, which was accelerated significantly by the COVID-19 pandemic in Latin American universities (Oportus-Torres et al., 2024), empirical research comparing specific WCF strategies for LMS environments remains limited. This study attempts to address this gap by assessing both the effects of ICF and IMCF provided exclusively via the Canvas LMS, thereby contributing evidence on feedback type effectiveness in a technology-mediated EFL writing context that has been under-researched in the literature.

3. Methodology

3.1 Research Design

This study used a prospective quasi-experimental mixed methods design that included a pre-test, post-test, and delayed post-test to examine the effects of WCF strategies on grammatical accuracy in EFL writing in a VLE. The quasi-experimental design was selected because of the nature of university course sections—it was not possible to randomly assign students to different conditions (Shadish et al., 2002). The mixed-methods approach enabled triangulation of quantitative data on writing accuracy with qualitative data on student perceptions, thereby providing a more comprehensive account of the impact of the feedback intervention (Creswell & Plano Clark, 2018). Figure 1 illustrates the sequential structure of the intervention across the 12-week study period.

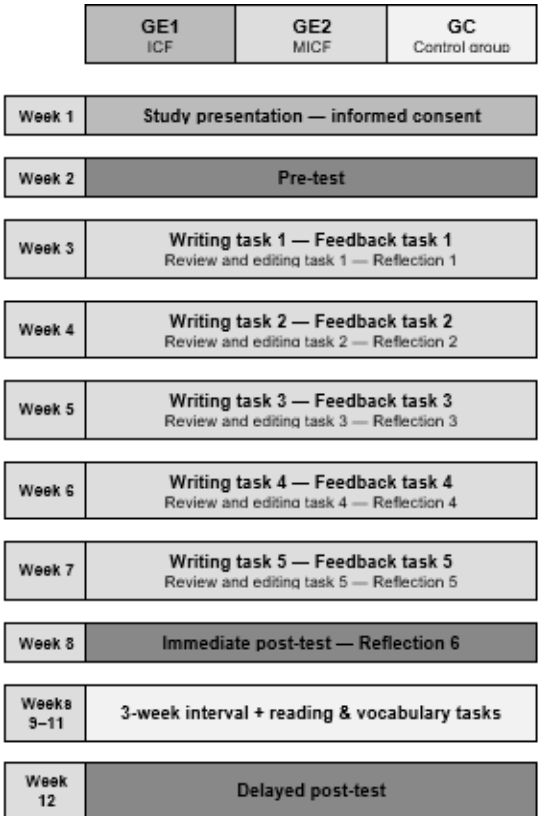

Figure 1: Research Design and Implementation Timeline

Note. GE1 = Experimental Group 1 (ICF); GE2 = Experimental Group 2 (IMCF); GC = Control Group (general comments).

The intervention comprised five writing tasks administered over Weeks 3–7, framed by a pre-test (Week 2), an immediate post-test (Week 8), and a delayed post-test (Week 12) following a three-week washout interval during which students completed reading and vocabulary tasks.

3.2 Participants

Participants were 60 undergraduate students (42 women, 18 men; age range: 19−20) enrolled in the second semester of a private university program in EFL. The sample was purposive, constituted by intact course sections accessible to the researcher (Dornyei, 2007), and distributed across three groups of 20 students each: EG1 (ICF condition), EG2 (IMCF condition), and CG (general comments condition). Table 1 summarizes the group structure. All participants were enrolled in a required EFL writing course and shared comparable academic backgrounds (B1 level). Informed consent was obtained from all participants before data collection, in accordance with institutional ethical guidelines (Ethical approval for this study was granted by the Comité de Ética, Bioética y Bioseguridad de la Vicerrectoría de Investigación y Desarrollo de la Universidad de Concepción, CEBB 1648-2024, March 2024).

Table 1: Group Structure and Feedback Conditions

Group	N	Feedback condition	Feedback type
EG1–Section 1	20	Indirect corrective feedback	Error location marked; no correction provided
EG2–Section 2	20	Indirect metalinguistic corrective feedback	Metalinguistic cues or error code; no correction provided
CG–Section 3	20	General comments	Content-only comments; no error correction

Note. All groups received the same writing tasks and general course instruction.

3.3 Data Collection Instruments

The instruments used in this research are the following:

1) Writing tests: Three parallel writing tasks were administered at the outset (pre-test, Week 2), immediately following the intervention (post-test, Week 8), and three weeks after its conclusion (delayed post-test, Week 12). In each task, students produced a text of between 200 and 250 words. The three tests measured the overall effectiveness of the feedback treatment in terms of grammatical accuracy improvement and durability of gains over time.

2) Student reflection journal (see Appendix 1): A reflection journal was completed after each of the five writing tasks and the immediate post-test, yielding six written reflections per participant. Each entry addressed five prompts: 1) Self-assessment of writing performance, 2) Learning acquired during revision and editing; 3) Perceived utility of teacher feedback, 4) Identification of writing strengths and weaknesses; and 5) Anticipated application of feedback to future tasks. A final reflection was collected at the conclusion of the intervention. Journal data were analyzed through thematic content analysis to examine student perceptions of the feedback strategies (see Appendix 1).

Participant quotes are identified by section and participant number (e.g., S2-P1 = Section 2, Participant 1) to preserve anonymity while allowing traceability across the data, with sections corresponding directly to feedback conditions (S1 = ICF; S2 = IMCF; S3 = CG). Journal entries were written in Spanish, the participants' L1, to allow for fuller expression of reflective thought. Thematic analysis was conducted in Spanish on the original journal entries to preserve meaning during interpretation. Representative excerpts were subsequently translated into English by the researcher for reporting purposes.

3.4 Intervention

The linguistic intervention consisted of the implementation of indirect and indirect metalinguistic WCF strategies within Canvas LMS, which was the institutional virtual learning environment. Feedback was provided by the researcher and two trained expert assistants who independently reviewed 30−35 tasks each before engaging in a consensus session to calibrate correction criteria in accordance with the feedback strategy assigned to each group (Kloss & Quintanilla, 2022). Feedback was delivered exclusively through the "insert comments" function in Canvas LMS, without any direct modification of students'

original texts, thereby ensuring that feedback remained advisory rather than corrective in form.

The three groups differed in feedback type as follows. EG1 received ICF, in which the instructor underlined or marked error locations without providing corrections, leaving students to identify and repair errors independently. EG2 received IMCF, in which the instructor provided a brief metalinguistic cue (a short grammatical description or error code) that specified the nature of the error without supplying the correction. The CG received general content-oriented comments only, with no targeted grammatical error correction. Upon receiving feedback, all students revised and edited their texts and completed a written reflection.

In accordance with the focused WCF approach supported by the literature (Ellis, 1997; Sheen et al., 2009), feedback in both experimental groups targeted three high-frequency grammatical error categories that had been identified in the participants' pre-test writing: article use, preposition use, and punctuation. These categories were selected because of their recurrence and their treatability through WCF (Ferris, 2013). Errors outside these three categories were not marked, to ensure that the feedback remained focused and manageable for learners. The control group received no targeted grammatical feedback on any error type.

3.5 Data Analysis

Quantitative data were analyzed using SPSS. Prior to inferential analysis, the Shapiro-Wilk test confirmed normality for all groups and time points ($p > .05$). However, Levene's test indicated a violation of the homogeneity of variances assumption. To ensure robustness of findings, both one-way ANOVA and the Kruskal-Wallis non-parametric test were conducted at each measurement point. Significant overall effects were followed up with Dunn's post-hoc test with Bonferroni correction to identify specific pairwise differences between groups. Qualitative data from the reflection journals were analyzed through thematic content analysis, by following the coding and categorization procedures outlined by Creswell and Plano Clark (2018). Atlas.ti (Version 24) software was used to support the coding and categorization process. Two independent coders categorized journal entries, and inter-rater agreement was verified through discussion and consensus.

4. Results

Results are presented in two subsections: a quantitative analysis of error means across feedback conditions (Section 4.1), followed by a qualitative thematic analysis of student reflections (Section 4.2).

4.1 Quantitative Results: Error Reduction Across Feedback Conditions

A quantitative analysis examined mean error counts at three measurement points (pre-test, post-test, and delayed post-test) across the three conditions. The Shapiro-Wilk test confirmed normality for all groups and time points ($p > .05$), while Levene's test indicated a violation of homogeneity of variances.

Accordingly, both ANOVA and Kruskal-Wallis tests were conducted and are reported.

Table 2: Mean Error Counts by Group and Measurement Point

Group	Pre-test M	Post-test M	Delayed post-test M	Change
Control	8.45	7.10	5.75	-2.70
ICF (EG1)	8.20	5.95	4.70	-3.50
IMCF (EG2)	8.50	5.10	3.85	-4.65
ANOVA p	.937	.033*	.020*	—
Kruskal-Wallis *p*	.902	.045*	.024*	—

*Note. M = mean number of errors per writing task. Lower scores indicate fewer errors and improved performance. Change = difference between pre-test and delayed post-test means. * p < .05 for both one-way ANOVA and Kruskal-Wallis tests.*

As shown in Table 2, the three groups were statistically equivalent at the pre-test (ANOVA: p = .937; Kruskal-Wallis: p = .902), confirming comparable baseline writing performance across conditions. At the post-test, statistically significant differences emerged (ANOVA: p = .033; Kruskal-Wallis: p = .045). The IMCF group showed the steepest decline, from M = 8.50 at pre-test to M = 5.10 at post-test (a reduction of 3.40 errors), followed by the ICF group (from M = 8.20 to M = 5.95; reduction of 2.25 errors), and the control group (from M = 8.45 to M = 7.10; reduction of 1.35 errors). The convergence of ANOVA and Kruskal-Wallis results strengthens confidence in these findings despite the violated homogeneity assumption.

At the delayed post-test, between-group differences strengthened further (ANOVA: p = .020; Kruskal-Wallis: p = .024). The IMCF group maintained the lowest mean error count (M = 3.85), representing a total reduction of 4.65 errors from pre-test, the largest gain of all three conditions. The ICF group also maintained improvement relative to the control (M = 4.70 vs. M = 5.75), though the gap between ICF and IMCF widened at this stage, suggesting that the metalinguistic dimension supported greater long-term retention of corrective information. To identify the specific pairings driving the overall significant differences, post-hoc pairwise comparisons were conducted using the Dunn test with Bonferroni correction (see Table 3). The same pattern emerged at both post-test and delayed post-test stages.

Table 3: Post-Hoc Pairwise Comparisons: Dunn Test with Bonferroni Correction

Stage	Comparison	*p*-adj	Significant?
Post-test	Control vs. ICF	> .05	No
	Control vs. IMCF	< .05	Yes*
	ICF vs. IMCF	> .05	No
Delayed post-test	Control vs. ICF	> .05	No
	Control vs. IMCF	< .05	Yes*
	ICF vs. IMCF	> .05	No

*Note. * p-adj < .05 after Bonferroni correction. Dunn test applied following significant Kruskal-Wallis results. The identical pattern of pairwise differences was observed at both post-test and delayed post-test stages.*

These post-hoc results refine the overall findings considerably. The significant omnibus effect was driven specifically by the difference between the control and IMCF conditions. The ICF group did not differ significantly from the control group after correction, suggesting that focused corrective feedback alone was insufficient to produce group-level differences distinguishable from natural practice effects. Equally, ICF and IMCF did not differ significantly from each other, indicating that while IMCF produced the largest absolute gains, the advantage over ICF did not reach statistical significance at the group level after Bonferroni correction.

It is worth noting that even the control group reduced its mean error count from pre-test to delayed post-test (from M = 8.45 to M = 5.75; a reduction of 2.70 errors), which may reflect general practice effects attributable to repeated writing task engagement. Nevertheless, only the IMCF condition produced a reduction large enough to be statistically distinguishable from this baseline improvement.

4.2 Qualitative Results: Thematic Analysis of Student Reflections

Thematic analysis of the 360 reflection journals identified six recurring themes related to students' perceptions of their writing development and feedback experiences.

4.2.1 Grammar and Language Errors

The most pervasive category is concerned with the recognition of grammar and language errors. Prepositions emerged as the single most frequently cited difficulty across all three sections, followed by punctuation (particularly comma placement), verb forms, and spelling. Many students identified the same error types across multiple tasks, indicating sustained awareness of specific weaknesses rather than their elimination. One participant in the IMCF group articulated this challenge: "I tend to have problems omitting prepositions, so I am now more aware of the requirements certain nouns have" (S2-P1).

ICF participants similarly identified recurring difficulties with prepositions and punctuation, though their reflections tended to be more task-specific: "I learned that I should review prepositions since I often confuse using in and at with certain places" (S1-P7). Among general comments, participants' awareness of errors was present but less linked to corrective strategies: "I continue to have basic problems: subject–verb agreement, incorrect use of verb tenses, and forgetting prepositions" (S3-P5).

4.2.2 Value of Teacher Feedback

In total 50 participants expressed positive perceptions of their teacher's feedback. IMCF participants particularly valued the process of guided self-correction, perceiving it as more effective for long-term learning: "Instead of simply fixing what was wrong, it gave us the tools to search for answers ourselves, thus learning more effectively" (S2-P16), and "The corrections are very useful, so I do not make the same mistake next time" (S2-P6).

ICF participants valued the precision of error location marking, even when metalinguistic explanation was absent: "Seeing exactly where the error was

helped me identify and correct them more quickly" (S1-P5). A minority of participants—predominantly in the ICF group—expressed a preference for more direct explanations; they argued that indirect feedback was insufficient when they did not already know the correct rule: "I would like to be told what the error was along with an explanation, because if I made the error, it means I do not know the correct form" (S1-P1). Among general comments participants, feedback was generally described in vague or ambiguous terms, and in some cases was absent entirely: "I did not receive feedback from the teacher" (S3-P4).

4.2.3 Self-Regulated Learning and Metacognition

In total 44 participants demonstrated metacognitive awareness by reflecting on their own learning processes, including the importance of rereading texts before submission and developing autonomous correction strategies. IMCF participants expressed the most elaborate metacognitive engagement: "It marks my errors without giving me the answer directly, which encourages me to find the correct answer myself" (S2-P7), and "I learned to recognize that using complex structures in English is not enough; one must also consider how an outside reader may interpret my words" (S2-P18).

ICF participants also reflected on metacognitive strategies, though they were more narrowly focused on error identification: "I learned that a revision where you have to guess the mistakes you had made could be something very useful, you get to guess all possible answers, so you use your knowledge more" (S1-P20), and "The fact that I was not told exactly where I went wrong also made me think about my errors by myself" (S1-P5).

General Comments participants reflected on self-monitoring in more general terms: "Rereading texts once finished helps a great deal in checking whether what was written is coherent" (S3-P6).

4.2.4 Perceived Writing Improvement Over Time

The 56 participants who explicitly tracked their progress across writing tasks, reported fewer errors, growing confidence or increased writing fluency. IMCF participants more frequently attributed improvement to feedback-driven self-correction: "The feedback helps me recognize and correct my errors, making me aware of my weaknesses so I can pay more attention to them in future tasks" (S2-P2).

ICF participants also reported improvement, though they often framed it in terms of task performance rather than strategic learning: "I do not think I am outstanding, but I feel I have improved over time since 80% of my mistakes are now only punctuation" (S1-P14), and "My performance has been improving as I practice my writing" (S1-P7).

General comments participants expressed their desire to improve but were less specific about strategies: "I try to apply corrections to future tasks. However, I still need to improve" (S3-P15).

4.2.5 Text Organization, Vocabulary, and Coherence

In total 35 participants reflected on higher-order writing concerns beyond surface-level mechanics, including paragraph organization, idea development, and appropriate vocabulary selection. This category was most prominent among IMCF participants: "I still have much skill to develop in terms of grammar and how to connect paragraphs, loose ideas, and more specific vocabulary" (S2-P1), and "I have a strong and vast vocabulary; however, I tend to get stuck when trying to connect my ideas" (S2-P14). ICF participants also reflected on organizational aspects, though less often: "I noticed that I use different connectors, not the typical ones" (S1-P13).

4.2.6 L1 Interference and Transfer

Some participants (n = 14) explicitly attributed writing difficulties to Spanish (L1) influence, including transfer of comma rules, literal translation of prepositions, and informal register habits. This theme appeared across all three groups: "I need to work more on English punctuation rules, as I confuse them with Spanish rules" (S3-P18), and "I learned the big difference a single letter or word can make: special/especial, story/history" (S2-P5).

ICF participants, similarly, described difficulties rooted in cross-linguistic transfer: "It is difficult for me to know which preposition to use in English because they work differently in Spanish" (S1-P4), and "Perhaps I should try to think more in English and less in Spanish" (S1-P17).

4.3 Comparison of Student Perceptions Across Feedback Conditions

Beyond the cross-cutting thematic categories, the data reveals meaningful differences in students' perceptions according to the type of WCF received. Table 4 summarizes these differences across five dimensions: Reflection depth, correction difficulty, perceived impact, student evaluation, and long-term transfer.

Table 4: Student Perceptions Across Feedback Conditions

Aspect	ICF (S1)	IMCF (S2)	General Comments (S3)
Reflection depth	**Medium: localized correction** *Very useful; I am especially grateful for the error marks on punctuation. (S1-P4)* *Seeing exactly where the error was helped me identify and correct it more quickly. (S1-P5)*	**High: transfer & self-regulation** *It marks my errors without giving me the answer directly, which encourages me to find the correct answer myself. (S2-P7)* *Instead of simply fixing what was wrong, it gave us the tools to search for answers ourselves and thus learn more effectively. (S2-P16)*	**Low: general, no clear guidance** *Recognizing errors and suggestions for future writing. (S3-P2)* *I did not receive feedback from the teacher. (S3-P4)*
Correction difficulty	**Moderate: some confusion** *Honestly, I preferred being told what I got wrong in comments, but trying to solve it myself is also helpful. (S1-P14)* *It is not really clear, but I think that it helps us to realize on our own what we had done wrong. (S1-P2)*	**Low: guided self-correction** *It marks my errors without giving me the answer directly. (S2-P7)* *It helped me become aware of my weaknesses so I could correct them and avoid repeating the same error. (S2-P10)*	**High: errors go unidentified** *I do not know where to place commas. I still have a lot to learn. (S3-P3)* *I always forget about the commas and I tend to put the before nouns a lot. (S3-P16)*
Perceived impact	**Immediate correction of targeted errors** *My performance has been improving as I practice my writing. (S1-P21)* *80% of my mistakes are now at least only punctuation. (S1-P14)*	**Sustained accuracy & vocabulary growth** *I keep adding everything I learn to my texts and can write with greater fluency. (S2-P1)* *The feedback helps me recognize and correct my errors and become aware of my weaknesses. (S2-P2)*	**Superficial: motivation without improvement** *I repeat the same mistakes without noticing. (S3-P6)* *I tend to make the same mistakes all the time. (S3-P16)*
Student evaluation	**Practical and useful** *Very useful; I am especially grateful for the error marks on punctuation. (S1-P4)* *The benefits were many, I came up with new ideas to rewrite the text and I wrote the best version of it. (S1-P20)*	**Positive and challenging** *Getting somebody else's point of view is crucial, especially if it comes from the professor. (S2-P5)* *Instead of simply fixing what was wrong, it gave us the tools to search for answers ourselves. (S2-P16)*	**Ambiguous: motivating but not actionable** *Not very useful but motivating. (S3-P17)* *The feedback helped make the text look more coherent and formal. (S3-P6)*

Long-term transfer	**Moderate: transfer to similar errors** *From now on I will pay more attention to my prepositions and punctuation. (S1-P7)* *I will remember my previous mistakes, because it sticks more in your mind if you have to correct it yourself. (S1-13)*	**High: applied across tasks** *I will no longer make the errors I used to make; now I will remember what was wrong and be able to correct it. (S2-P10)* *I will keep it in mind when writing new texts and hope to identify my errors independently. (S2-P18)*	**Low: no clear strategy** *I tend to make the same mistakes all the time. (S3-P16)* *I repeat the same errors without noticing. (S3-P9)*

Note. Participant codes refer to the section and the anonymized participant number.

IMCF recipients consistently reported the deepest and most process-oriented reflections, with high metacognitive engagement and explicit reference to transfer across tasks: "The feedback has been very useful, as I have not repeated the errors from the previous task" (S2-P5).

ICF recipients reported practical utility and immediate improvement, though with more limited evidence of long-term transfer. Students who received general comments reported the most ambiguous perceptions, consistently referring to an inability to translate feedback into concrete improvement strategies: "I always make the same mistakes, but I can correct them" (S1-P20).

The convergence of qualitative and quantitative evidence thus provides robust support for the role of IMCF in promoting both immediate and long-term writing improvement, while also revealing a tension (present particularly in the ICF group) between the pedagogical benefits of indirect feedback and students' expressed desire for more explicit explanatory guidance.

5. Discussion

The quantitative results partially support the hypothesis that indirect metalinguistic feedback promotes greater grammatical accuracy than non-metalinguistic indirect feedback. The IMCF group demonstrated the largest error reduction across all three measurement points and was the only condition to produce a statistically significant improvement over the control at both post-test and delayed post-test stages. These findings are consistent with research demonstrating the superiority of metalinguistic feedback for grammatical accuracy on specific language features (Kloss & Quintanilla, 2022; Ortiz & Ferreira, 2014; Sheen, 2007).

The ICF group also showed meaningful improvement in raw error reduction relative to the control, yet this difference did not reach statistical significance once Bonferroni correction was conducted. This does not necessarily indicate that ICF is ineffective; rather, it suggests that, without metalinguistic information specifying the nature of the error, learners may lack sufficient guidance to consistently produce accurate self-repair, particularly for rule-governed structures such as article and preposition use that require explicit grammatical

knowledge (Ferris, 2013). This interpretation is reinforced by the qualitative data, according to which ICF recipients frequently reported difficulty interpreting feedback when they did not already know the relevant grammatical rule.

In contrast, the pairwise comparison between ICF and IMCF did not reach statistical significance after Bonferroni correction and should be interpreted cautiously given the modest group sizes. The observed difference in means—1.25 fewer errors in the IMCF group at delayed post-test—is practically meaningful and directionally consistent with theoretical predictions, yet the current sample was insufficient to detect this difference at a corrected significance level. The gap between ICF and IMCF at the delayed post-test stage, relative to the immediate post-test, nonetheless supports the claim that metalinguistic information promotes deeper encoding and greater long-term retention (Ellis, 2008; Sheen, 2011), thereby replicating the delayed post-test advantage for metalinguistic feedback reported by Kloss and Quintanilla (2022) in a comparable Chilean university context.

Beyond the quantitative results, the qualitative findings provide important complementary insights. IMCF recipients consistently produced the most process-oriented and metacognitively rich reflections, with explicit reference to cross-task transfer and engagement with grammatical rules beyond the immediate error corrected. This pattern suggests that metalinguistic feedback activated the forethought and self-reflection phases of Zimmerman's (2000) SRL cycle more fully than the other conditions, because learners were required to diagnose and resolve errors independently and had to rely on the monitoring and self-evaluation components of SRL.

By contrast, control group participants consistently described feedback as motivating but not actionable; they were unable to translate general comments into concrete accuracy improvements, which highlights the pedagogical necessity of targeted corrective information for accuracy development (Ferris & Roberts, 2001). The persistent availability of feedback within Canvas LMS may have amplified these effects and enabled learners to consult metalinguistic cues while revising and across subsequent writing tasks, consistent with Ene and Upton's (2014) observation that electronic feedback encourages enhanced engagement through persistent access and visual salience.

However, these findings should be interpreted in the context of certain limitations. First, data were collected from a single university, which may limit the generalizability of the findings to other institutional contexts. Second, the use of intact course sections rather than random assignments, combined with a relatively small sample size of 20 participants per group, limit causal inference, reduces statistical power, and restricts the extent to which results can be extrapolated to wider populations. Third, the use of purposive sampling introduces the possibility of selection bias, because participants were selected according to accessibility rather than random selection. To enhance both the generalizability and transferability of findings, future research would benefit from larger, randomly sampled populations across multiple institutions.

6. Conclusion

This study investigated the differential effects of ICF and IMCF on grammatical accuracy in EFL writing within a VLE and examined student perceptions of these feedback types through analysis of reflection journals. Findings of the quantitative study confirm that IMCF resulted in significant and more continuous error reduction than the control condition at both post-test and delayed post-test.

This increased performance gap at the delayed post-test indicates that metalinguistic information promotes deeper encoding of grammar rules and improved long-term retention, consistent with Schmidt's (1990) noticing hypothesis and other studies (Kloss & Quintanilla, 2022; Ortiz & Ferreira, 2014). The qualitative findings are consistent with the overall picture: IMCF recipients had the highest level of metacognitive engagement and the strongest evidence of SRL in their reflection journals, while participants in the control group could not consistently translate general comments into effective improvement strategies.

Overall, these findings suggest a notable positive impact of metalinguistic information on indirect feedback, particularly in supporting both accuracy and self-regulated learning in virtual EFL writing instruction. For practitioners designing feedback in LMS-based writing courses, focused IMCF that targets high-frequency, treatable error categories is recommended to support continuous learner engagement throughout the writing cycle.

More broadly, this study advances knowledge on LMS-based feedback practices by demonstrating that the specific features of Canvas—persistent access, asynchronous delivery, and visual salience—can support the effectiveness of metalinguistic feedback in ways that merit further investigation. These findings have direct implications for the design of digital feedback interventions in EFL writing courses and contribute empirical grounding to the growing body of research on self-regulated learning in technology-mediated language learning environments.

7. Conflict of Interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The author used AI-based tools to assist with language editing, paraphrasing and manuscript refinement. No AI was used for generating research ideas, conducting data analysis, interpreting results, or drawing conclusions. All intellectual contributions and final revisions were completed and approved by the author, who takes full responsibility for the manuscript's accuracy, integrity, and originality.

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Appendix

Appendix 1: Student Reflection Journal

Complete the following reflection based on what you have learned today. When responding:

- Read each question carefully.
- Reflect honestly on your experience.
- Provide specific examples where possible.
- Review your answers before submitting.

1. How would you evaluate your performance on the writing task?
2. What did you learn during the process of revising and editing this task?
3. How useful was the teacher's feedback in helping you improve your text?
4. What strengths and weaknesses did you identify during the revision and editing process?
5. In what ways do you think the feedback received will be useful in future writing tasks?