

ChatGPT-Mediated Direct and Indirect Hybrid L1 Feedback in English Writing

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Abstract: This study examined the impact of two types of L1-mediated written corrective feedback—direct and indirect hybrid (indirect plus metalinguistic)—on L2 writing. Twenty-six Korean university students, at beginner to intermediate proficiency levels, completed a three-stage revision task: an initial draft, a first revision after receiving feedback, and a second revision without further assistance. Participants were divided into two groups, each receiving L1 feedback via ChatGPT: one group received direct feedback, and the other received indirect hybrid feedback. Uptake was analyzed across five writing components: content, organization, grammar, vocabulary, and mechanics. Both feedback types significantly improved writing after the first revision, with the most substantial uptake observed in mechanics and grammar. However, uptake decreased in the second revision, particularly in content and organization, and new or reintroduced errors were common. Notably, direct feedback proved more effective for beginner-level learners in later revisions, specifically for structural improvements and overall uptake. Conversely, intermediate learners benefited more from indirect hybrid feedback, especially in content development. These findings suggest that feedback effectiveness may vary with learner proficiency, offering pedagogical implications for customizing AI-mediated feedback in L2 writing instruction.

Keywords: ChatGPT; L2 Writing; (In)Direct Feedback; Hybrid Feedback; Uptake

1. Introduction

Second language (L2) learners often struggle with a wide range of writing challenges, from surface-level errors in grammar and mechanics to more complex ones related to content and organization. Written corrective feedback (WCF) has long been recognized as an essential instructional tool to support these L2 learners, as it helps them notice errors and improve accuracy and fluency over time [1, 2]. However, providing detailed and individualized feedback—especially across multiple drafts—places considerable demands on instructors, particularly in large classes or contexts with limited instructional time [3].

Recent advances in artificial intelligence (AI), particularly in large language models such as ChatGPT, offer a promising means to support feedback delivery in L2 writing. Developed by OpenAI, ChatGPT can engage users in linguistically appropriate, context-sensitive dialogue and generate metalinguistic explanations. These affordances position it as a potentially effective tool for assisting learners with error correction and revision in writing tasks [4-6]. When integrated strategically, AI-mediated feedback can complement human instruction, reduce teacher workload, and enhance learner engagement.

Among the types of feedback available to L2 writers, direct feedback—which provides explicit corrections—has been shown to be particularly helpful for beginner-level learners who benefit from clear models of target language forms [7]. In contrast, indirect feedback, especially when combined with metalinguistic explanations (i.e., hybrid feedback), encourages learners to reflect on their errors and promotes deeper cognitive processing [8, 9]. Moreover, providing feedback in the learners' first language (L1) has been found to enhance uptake by reducing cognitive load and improving clarity, especially among lower-proficiency learners [10, 11].

The present study builds on these theoretical and empirical insights to investigate the effects of direct feedback and indirect hybrid feedback in L1, delivered via ChatGPT, on L2 writing. Drawing on a three-stage

revision design, the study tracks learners' uptake across two revisions and examines both immediate and delayed improvements in five key writing components: content, organization, grammar, vocabulary, and mechanics. In doing so, it aims to contribute to the growing literature on feedback effectiveness, L1 support, and AI-assisted writing instruction [12].

2. Literature Review

Written corrective feedback (WCF) plays a central role in second language (L2) writing instruction. It provides learners with opportunities to notice linguistic gaps and revise their output toward more target-like forms [1]. Among the various types of WCF, direct feedback—where errors are explicitly corrected—has been found to be particularly effective for lower-proficiency learners, as it reduces ambiguity and promotes immediate uptake [7]. In contrast, indirect feedback, which highlights errors without providing corrections, encourages learners to self-edit and has been associated with longer-term retention due to the cognitive effort involved in processing [13].

More recently, L2 researchers have explored hybrid forms of feedback that combine indirect feedback with metalinguistic explanations. These approaches are informed by interactionist and sociocognitive theories, which emphasize the importance of noticing, reflection, and guided learning in language acquisition [14]. Metalinguistic feedback helps learners understand the nature of their errors by offering grammatical or lexical clues, often in the form of codes or explanations [15]. When provided in learners' first language (L1), such feedback may reduce cognitive overload and enhance comprehension—particularly for lower-level learners [16].

In classroom and digital contexts alike, hybrid feedback is increasingly being delivered through AI-mediated tools such as ChatGPT. These tools can offer L1-based explanations and support learner autonomy while reducing instructor workload. Preliminary findings suggest that such tools can facilitate meaningful revision and promote metacognitive engagement when aligned with instructional objectives [5, 6].

Uptake—the learner's successful incorporation of feedback into subsequent revisions—has become a key indicator of WCF effectiveness [9]. Studies focusing on revision-stage learning have shown that uptake is typically higher in surface-level errors (e.g., grammar, mechanics) than in global-level issues (e.g., content, organization), which require more complex restructuring and deeper rhetorical understanding [2], [17]. For instance, [8] found that while learners corrected many local errors in the first revision, they often reintroduced or added new errors in the second, underscoring the need to examine uptake over multiple drafts. Examining both immediate uptake (Initial Draft to First Revision) and delayed uptake (First to Second Revision) provides a more comprehensive understanding of learners' internalization of feedback. This approach helps distinguish short-term revisions from longer-term learning outcomes.

Providing feedback in the learners' L1 has been shown to be especially beneficial for lower-proficiency learners, as it enhances clarity and supports deeper processing [10]. Several studies have found that L1-based feedback can facilitate metalinguistic awareness and help learners connect form and meaning more effectively [11]. Moreover, matching feedback type to learners' proficiency level—such as offering direct feedback to beginners and metalinguistic feedback to more advanced learners—can maximize its instructional impact [12].

Building on this foundation, the present study investigates how direct feedback and indirect hybrid feedback in L1 influence the uptake of different error types across two revision stages. It contributes to the growing literature on AI-mediated feedback, revision-stage learning, and differentiated instruction based on proficiency level.

3. Method

3.1 Participants and Research Questions

Twenty-six students enrolled in an advanced reading course at a university in Busan participated in this study during the fall semester of 2024. All participants completed the online Cambridge English test before the study. Based on their test results, their proficiency levels were as follows: beginner-high (A2) for 12 students, intermediate-low (B1) for 8, intermediate-high (B2) for 4, and advanced-low (C1) and advanced-high (C2) for 1 student each. The participants came from various academic disciplines, including Humanities, Social Sciences, Education, and Engineering.

The study aimed to examine whether there were significant differences in the uptake of content, organization, vocabulary, grammar, mechanics, and overall performance after receiving two types of feedback: (1) direct feedback in the L1, and (2) indirect hybrid feedback in the L1 (combining indirect feedback with metalinguistic explanations), delivered via ChatGPT, a large language model developed by OpenAI.

3.2 Research Design

The study employed a three-stage revision design to examine both the immediate and sustained effects of written corrective feedback (WCF), as outlined in Table 1. In Stage 1, students produced an initial in-class draft under timed, unscaffolded conditions, serving as a baseline measure of writing performance. In Stage 2, written feedback was provided approximately two weeks later, addressing both global (e.g., content, organization) and local (e.g., grammar, vocabulary, mechanics) aspects of writing. Students then submitted a first revision in response to this feedback. Two weeks after submitting the first revision—and without receiving any additional guidance—they completed a second revision, which allowed for the observation of error retention, reintroduction, or emergence.

This design enabled a detailed stage-by-stage analysis of feedback uptake by comparing the progression from Initial Draft to First Revision (immediate uptake) and from First Revision to Second Revision (delayed uptake), providing insight into both short-term responsiveness and longer-term internalization.

Both types of feedback were generated using ChatGPT based on structured prompts. The direct feedback group received explicit corrections in the students' first language (L1), whereas the indirect hybrid feedback group received L1-based feedback that combined indirect feedback (e.g., underlining or flagging errors) with metalinguistic explanations. The generated feedback was reviewed by the instructor prior to delivery. The indirect hybrid feedback was designed to promote learner reflection and metacognitive engagement by helping students recognize the nature of their errors and consider appropriate revisions, aligning with the principles of form-focused instruction.

Table 1. Research Design

	Direct Feedback	Indirect Hybrid Feedback
Stage 1	Individual Writing 1 st Drafts in class	
Stage 2	Feedback and the 1 st Revision after 2 weeks	
Stage 3	The 2 nd Revision after 2 weeks	

4. Results

4.1 Descriptive Statistics of Writing Feedback

Table 2 presents descriptive statistics for the initial drafts submitted by 26 students. On average, students wrote 150.62 words per draft ($SD = 62.88$), with a mean of 13.15 total errors ($SD = 2.29$), corresponding to an average error rate of 9.43% per 100 words ($SD = 2.38$). Among the five error categories, grammar errors were the most frequent ($M = 5.12$, $SD = 1.58$), followed by vocabulary ($M = 2.54$, $SD = 0.71$), content ($M = 2.04$, $SD = 0.20$), organization ($M = 2.00$, $SD = 0.28$), and mechanics ($M = 1.46$, $SD = 0.58$). The relatively low standard deviations for content and organization suggest that these error types were consistently distributed across participants.

Table 3 summarizes the longitudinal patterns across the first and second revisions. The mean number of total errors decreased substantially from the initial draft to the first revision ($M = 4.65$, $SD = 0.94$) but increased slightly in the second revision ($M = 5.81$, $SD = 1.47$). A similar trend was observed in the error rate per 100 words, which dropped to 3.35% ($SD = 0.94$) in the first revision and rose to 4.10% ($SD = 1.21$) in the second. This subsequent increase indicates that the second revision process generated both reintroduced and entirely new errors.

In terms of uptake, the first revision showed the highest gains across all categories, particularly in mechanics ($M = 98.73\%$, $SD = 6.47$) and grammar ($M = 68.12\%$, $SD = 5.53$). Moderate uptake was observed in vocabulary ($M = 60.08\%$, $SD = 12.11$), organization ($M = 52.58\%$, $SD = 10.23$), and content ($M = 50.65\%$, $SD = 3.33$). However, uptake declined across all categories in the second revision, most notably in grammar ($M = 46.15\%$, $SD = 28.41$), content ($M = 42.31\%$, $SD = 50.38$), and organization ($M = 40.00\%$, $SD = 50.00$). This reduction is directly attributable to the specific calculation of uptake between the first and second revisions, during which previously resolved issues resurfaced (3 in organization, 5 in grammar, and 4 in vocabulary) and new errors emerged (1 in content, 3 in organization, 20 in grammar, 10 in vocabulary, and 5 in mechanics).

Table 2. Descriptive Statistics of Student Writing Drafts

Components	N	Mean	SD
Total Words	26	150.62	62.88
Errors	26	13.15	2.29
Error %	26	9.43	2.38
Content Errors	26	2.04	.20
Organization Errors	26	2.00	.28
Grammar Errors	26	5.12	1.58
Vocabulary Errors	26	2.54	.71
Mechanics Errors	26	1.46	.58

Table 3. Descriptive Statistics of Longitudinal Revisions

Components	Feedback	N	Mean	SD
Total Errors	1 st Revision	26	4.65	.94
	2 nd Revision		5.81	1.47
Error %	1 st Revision	26	3.35	.94
	2 nd Revision		4.10	1.21
Content Uptake (%)	1 st Revision	26	50.65	3.33
	2 nd Revision		42.31	50.38
Organization Uptake (%)	1 st Revision	26	52.58	10.23
	2 nd Revision		40	50
Grammar Uptake (%)	1 st Revision	26	68.12	5.53
	2 nd Revision		46.15	28.41
Vocabulary Uptake (%)	1 st Revision	26	60.08	12.11
	2 nd Revision		42	49.33
Mechanics Uptake (%)	1 st Revision	26	98.73	6.47
	2 nd Revision		75	46.29
Total Uptake (%)	1 st Revision	26	64.64	3.94
	2 nd Revision		47.89	15.75

Table 4 reports the cumulative uptake—defined as the proportion of errors from the initial draft that were successfully corrected by the final draft—for each error type. The overall cumulative uptake was high ($M = 77.80\%$, $SD = 7.84$), indicating that most students were able to resolve a substantial portion of their initial errors over two rounds of revision. Among the error types, mechanics showed the highest cumulative uptake ($M = 96.80\%$, $SD = 11.56$), followed by grammar ($M = 80.38\%$, $SD = 10.77$), vocabulary ($M = 75.33\%$, $SD = 22.66$), and both content and organization (each $M = 71.15\%$, $SD = 25.19$). These results suggest that students responded most effectively to feedback targeting surface-level linguistic features, while uptake in global-level components (content and organization) was more variable.

Table 4. Descriptive Statistics of Cumulative Uptake

Components	N	Mean	SD
Content Uptake (%)	26	71.15	25.19
Organization Uptake (%)	26	71.15	25.19
Grammar Uptake (%)	26	80.38	10.77
Vocabulary Uptake (%)	26	75.33	22.66
Mechanics Uptake (%)	26	96.80	11.56
Total Uptake (%)	26	77.80	7.84

4.2 The Longitudinal Effects of Writing Feedback

Tables 5 through 7 compare the uptake performance between the direct and indirect hybrid feedback groups across two revision stages and cumulatively. Table 5 presents the results for the first revision. Uptake rates across all error categories were similar between groups. Grammar (Direct = 67.73%, Indirect Hybrid = 68.64%) and vocabulary (Direct = 59.60%, Indirect Hybrid = 60.73%) showed nearly identical performance, and mechanics uptake remained high in both groups (100% vs. 97%). Total uptake was virtually equivalent (Direct = 64.65%, Indirect Hybrid = 64.63%, $t = .007$, $p = .497$), with no statistically significant differences. This suggests that both feedback types were equally effective in facilitating immediate uptake following the first revision.

Table 5. Feedback Effects in the 1st Revision

Uptake (%)	Feedback	N	Mean	t	p
Content	Direct	15	50.00	-1.00	.170
	Indirect Hybrid	11	51.55		
Organization	Direct	15	50.00	-1.31	.110
	Indirect Hybrid	11	56.09		
Grammar	Direct	15	67.73	-.404	.345
	Indirect Hybrid	11	68.64		
Vocabulary	Direct	15	59.60	-.230	.410
	Indirect Hybrid	11	60.73		
Mechanics	Direct	15	100	1.00	.170
	Indirect Hybrid	11	97.00		
Total	Direct	15	64.65	.007	.497
	Indirect Hybrid	11	64.63		

$p < .05^*$, $p < .01^{**}$

Table 6 summarizes uptake outcomes in the second revision. While the indirect hybrid group outperformed the direct group in content uptake (54.55% vs. 33.33%), the direct group showed higher uptake in organization (46.67% vs. 30.00%) and mechanics (100% vs. 66.67%). However, none of these differences reached statistical significance. Overall, uptake decreased in the second revision for both groups, and no feedback type showed a consistent advantage.

Table 6. Feedback Effects in the 2nd Revision

Uptake (%)	Feedback	N	Mean	t	p
Content	Direct	15	33.33	-1.063	.149
	Indirect Hybrid	11	54.55		
Organization	Direct	15	46.67	.811	.213
	Indirect Hybrid	10	30.00		
Grammar	Direct	15	50.00	.800	.216
	Indirect Hybrid	11	40.91		
Vocabulary	Direct	15	43.33	.162	.436
	Indirect Hybrid	10	40.00		
Mechanics	Direct	2	100	1.581	.087
	Indirect Hybrid	6	66.67		
Total	Direct	15	49.57	.628	.268
	Indirect Hybrid	11	45.60		

$p < .05^*$, $p < .01^{**}$

Table 7 reports cumulative uptake from the initial to the final draft. Both groups demonstrated strong overall gains, with total uptake exceeding 77% in each case (Direct = 77.39%, Indirect Hybrid = 78.37%). Grammar and vocabulary uptake were comparable, while the indirect hybrid group showed a slight advantage in content (77.27% vs. 66.67%), and the direct group maintained higher performance in mechanics (100% vs. 92.43%). None of these differences were statistically significant. These results indicate that both feedback types

supported substantial cumulative improvement, particularly in grammar and mechanics, with no significant difference in long-term effectiveness.

Table 7. Cumulative Uptake in the 1st and 2nd Revisions

Uptake (%)	Feedback	N	Mean	t	p
Content	Direct	15	66.67	-1.063	.149
Cumulative	Indirect Hybrid	11	77.27		
Organization	Direct	15	73.33	.507	.308
Cumulative	Indirect Hybrid	10	68.18		
Grammar	Direct	15	80.87	.247	.404
Cumulative	Indirect Hybrid	11	79.71		
Vocabulary	Direct	15	75.01	-.082	.467
Cumulative	Indirect Hybrid	10	75.76		
Mechanics	Direct	2	100	1.455	.088
Cumulative	Indirect Hybrid	6	92.43		
Total	Direct	15	77.39	-.340	.369
Cumulative	Indirect Hybrid	11	78.37		

$p < .05^*$, $p < .01^{**}$

4.3 Effects of Proficiency on Writing Feedback

Table 8 compares uptake rates between the direct and indirect hybrid feedback groups among low-level learners ($n = 6$ per group) across both revisions. In the first revision, uptake was generally similar across groups in all categories. Grammar (Direct = 71.17%, Indirect Hybrid = 71.00%) and vocabulary (58.50% in both groups) showed nearly identical rates, while content and organization uptake were marginally higher in the indirect hybrid group (52.83% vs. 50.00%), though not statistically significant ($ps > .18$). Mechanics uptake was perfect in both groups, and total uptake was nearly equivalent (Direct = 65.02%, Indirect Hybrid = 65.67%).

In contrast, more notable differences emerged in the second revision. The direct group demonstrated higher uptake in content (50.00% vs. 33.33%) and grammar (66.67% vs. 41.67%), though these differences were not statistically significant. However, the direct group significantly outperformed the indirect hybrid group in organization (66.67% vs. 16.67%, $t = 1.861$, $p = .046$) and in total uptake (59.17% vs. 38.60%, $t = 2.416$, $p = .018$).

Table 8. Longitudinal Comparison of Low Level

Uptake (%)	Feedback	N	Mean	t	p
Content 1 st	Direct	6	50.00	-	.182
	Indirect Hybrid	6	52.83	1.00	
Organization 1 st	Direct	6	50.00	-	.182
	Indirect Hybrid	6	52.83	1.00	
Grammar 1 st	Direct	6	71.17	.059	.477
	Indirect Hybrid	6	71.00		
Vocabulary 1 st	Direct	6	58.50	.000	.500
	Indirect Hybrid	6	58.50		
Mechanics 1 st	Direct	6	100		
	Indirect Hybrid	6	100		
Total 1 st	Direct	6	65.02	-.30	.383
	Indirect Hybrid	6	65.67	6	
Content 2 nd	Direct	6	50.00	.542	.300
	Indirect Hybrid	6	33.33		
Organization 2 nd	Direct	6	66.67	1.86	.046*
	Indirect Hybrid	6	16.67	1	
Grammar 2 nd	Direct	6	66.67	1.34	.105
	Indirect Hybrid	6	41.67	2	
Vocabulary 2 nd	Direct	6	50.00	.000	.500
	Indirect Hybrid	6	50.00		

Mechanics 2 nd	Direct	6			
	Indirect Hybrid	6	66.67		
Total 2 nd	Direct	6	59.17	2.41	.018*
	Indirect Hybrid	6	38.60	6	

$p < .05^*$, $p < .01^{**}$

Table 9 reports the cumulative uptake from the initial to the final draft for the same low-level learners. Uptake was generally high in both groups, with grammar showing strong gains (Direct = 86.63%, Indirect Hybrid = 80.57%) and mechanics nearing ceiling levels (Direct = 100%, Indirect Hybrid = 91.67%). The direct group also achieved higher cumulative uptake in organization (83.33% vs. 58.33%), a difference that was statistically significant ($t = 1.861$, $p = .046$). These results suggest that for lower-proficiency learners, direct feedback may be more effective in later-stage revisions, particularly in enhancing structural aspects and overall performance.

Table 9. Cumulative Uptake of Low Level in 1st and 2nd Revisions

Uptake (%)	Feedback	N	Mean	t	p
Content	Direct	6	75.00	.542	.300
Cumulative	Indirect Hybrid	6	66.67		
Organization	Direct	6	83.33	1.861	.046*
Cumulative	Indirect Hybrid	6	58.33		
Grammar	Direct	6	86.63	.873	.206
Cumulative	Indirect Hybrid	6	80.57		
Vocabulary	Direct	6	77.78	.000	.500
Cumulative	Indirect Hybrid	6	77.78		
Mechanics	Direct	6	100	1.00	.182
Cumulative	Indirect Hybrid	6	91.67		
Total	Direct	6	80.38	.705	.249
Cumulative	Indirect Hybrid	6	76.98		

$p < .05^*$, $p < .01^{**}$

Table 10 compares uptake performance between direct and indirect hybrid feedback among intermediate-level learners (Direct: $n = 9$, Indirect Hybrid: $n = 5$). In the first revision, uptake rates were consistent across groups. Grammar (Direct = 65.44%, Indirect Hybrid = 65.80%) and vocabulary (60.33% vs. 63.40%) uptake were nearly identical. Slight advantages were observed in organization and mechanics for the direct and indirect hybrid groups, respectively, but none of the differences reached statistical significance. Total uptake was comparable (Direct = 64.40%, Indirect Hybrid = 63.39%).

However, in the second revision, the indirect hybrid group showed significantly higher content uptake (80.00%) compared to the direct group (22.22%), $t = -2.338$, $p = .019$. While the indirect hybrid group also outperformed the direct group in total uptake (54.00% vs. 43.18%), this difference approached but did not reach significance ($p = .052$).

Table 10. Longitudinal Comparison of Intermediate Level

Uptake (%)	Feedback	N	Mean	t	p
Content 1 st	Direct	9	50.00		
	Indirect Hybrid	5	50.00		
Organization 1 st	Direct	9	50.00	-1.00	.187
	Indirect Hybrid	5	60.00		
Grammar 1 st	Direct	9	65.44	-.122	.452
	Indirect Hybrid	5	65.80		
Vocabulary 1 st	Direct	9	60.33	-.366	.360
	Indirect Hybrid	5	63.40		
Mechanics 1 st	Direct	9	100	1.00	.187
	Indirect Hybrid	5	93.40		

Total 1 st	Direct	9	64.40		
	Indirect Hybrid	5	63.39	.402	.347
Content 2 nd	Direct	9	22.22	-	
	Indirect Hybrid	5	80.00	2.338	.019*
Organization 2 nd	Direct	9	33.33		
	Indirect Hybrid	4	50.00	-.531	.303
Grammar 2 nd	Direct	9	38.89		
	Indirect Hybrid	5	40.00	-.086	.466
Vocabulary 2 nd	Direct	9	38.89		
	Indirect Hybrid	4	25.00	.472	.323
Mechanics 2 nd	Direct	2	100		
	Indirect Hybrid	3	66.67	.775	.248
Total 2 nd	Direct	9	43.18	-	
	Indirect Hybrid	5	54.00	1.777	.052

$p < .05^*, p < .01^{**}$

Table 11 presents cumulative uptake across both revisions. The indirect hybrid group again showed a significant advantage in content (90.00% vs. 61.11%, $t = -2.338$, $p = .019$), while differences in other areas—including grammar (77.03% vs. 78.68%), vocabulary (73.16% vs. 73.34%), and organization (66.67% vs. 80.00%)—were not statistically significant. Mechanics uptake remained high in both groups. Total cumulative uptake was slightly higher in the indirect hybrid group (80.02% vs. 75.39%), though the difference was not significant. Overall, these findings indicate that indirect hybrid feedback is particularly effective in promoting content development among intermediate-level learners, especially across multiple revisions.

Table 11. Cumulative Uptake of Intermediate Level in the 1st and 2nd Revisions

Uptake (%)	Feedback	N	Mean	t	p
Content	Direct	9	61.11		
Cumulative	Indirect Hybrid	5	90.00	-2.338	.019*
Organization	Direct	9	66.67		
Cumulative	Indirect Hybrid	5	80.00	-.926	.186
Grammar	Direct	9	77.03		
Cumulative	Indirect Hybrid	5	78.68	-.308	.382
Vocabulary	Direct	9	73.16		
Cumulative	Indirect Hybrid	5	73.34	-.014	.494
Mechanics	Direct	9	100		
Cumulative	Indirect Hybrid	5	93.34	1.00	.187
Total	Direct	9	75.39		
Cumulative	Indirect Hybrid	5	80.02	-1.376	.098

$p < .05^*, p < .01^{**}$

5. Conclusion

This study examined the longitudinal effects of written corrective feedback (WCF) on second language (L2) writing performance across multiple revisions. The findings suggest that students showed noticeable improvements after the first revision, particularly in grammar and mechanics; however, these gains appeared to diminish—or in some cases reverse—by the second revision. Although the overall cumulative uptake across error types was relatively high (77.8%), uptake declined from the first to the second revision across all categories, with decreases observed in grammar, content, and organization. These patterns indicate that while initial feedback may facilitate short-term improvement, sustaining progress across multiple revisions may require additional instructional support, particularly for higher-order aspects such as content and organization.

The observed tendency for mechanical and grammatical features to show relatively higher uptake is broadly consistent with previous research suggesting that surface-level features are more responsive to WCF [7]. In contrast, global features such as content and organization appear to require more sustained guidance and

engagement [17]. The re-emergence of errors in later revisions further points to the importance of fostering learners' metacognitive awareness and self-monitoring strategies over time [8].

From a pedagogical perspective, these findings tentatively support the use of staged feedback cycles that address both local and global issues, along with instructional support to help learners interpret and apply feedback across revisions. Additional scaffolding—such as teacher–student conferences or guided peer review—may be particularly beneficial in promoting continued uptake beyond initial revisions [9].

Importantly, the interpretation of differences across proficiency levels and feedback types should be treated with caution due to the small subgroup sample sizes in this study. While the results tentatively suggest that lower-proficiency learners may benefit more from direct feedback, particularly in terms of accuracy and organizational clarity, this pattern remains exploratory [7]. Similarly, although higher-proficiency learners appeared to engage more productively with indirect hybrid feedback in areas such as content development, this tendency should be interpreted cautiously [1], [8]. Further research with larger and more balanced samples is needed to validate these patterns and to more robustly examine the interaction between learner proficiency and feedback type in AI-mediated WCF contexts.

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