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THE EFFICACY OF DIGITAL AND NON-DIGITAL CORRECTIVE FEEDBACK IN INDONESIAN SENIOR HIGH SCHOOL EFL WRITING: A SYSTEMATIC LITERATURE REVIEW

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Abstract: This systematic literature review examines evidence on digital and non-digital corrective feedback (CF) in Indonesian senior high school EFL writing, focusing on writing accuracy, revision behavior, and engagement, and relates the findings to second language acquisition (SLA) theories. Following PRISMA 2020, 700 records from Google Scholar (2015–2025) were screened, and 18 empirical studies were appraised and synthesized narratively. Eleven studies examined non-digital CF, six digital CF, and one a hybrid approach; five were rated higher in confidence and nine lower. Measured gains in writing performance were reported mainly for non-digital CF (coded, indirect, direct, and peer feedback), whereas evidence on digital CF (AI tools and Google Docs) rests largely on perceptions and small descriptive studies, with recurring concerns about over-reliance. No study compared digital and non-digital CF directly, so claims of superiority are not supported. The findings are compatible with Noticing, Output, sociocultural, and Affective Filter perspectives, but these links are interpretive. Hybrid feedback appears promising but needs further research.

Keywords: corrective feedback; digital feedback; non-digital feedback; senior high school; EFL writing; systematic literature review

INTRODUCTION

Writing is widely regarded as one of the most complex skills for English as a Foreign Language (EFL) learners because it demands the simultaneous mastery of grammar, vocabulary, coherence, and organization, together with problem-solving and self-regulation (Kormos, 2023). For senior high school students, who are still developing linguistic accuracy and rhetorical control, difficulties are often visible in content, organization, vocabulary, and mechanics (Lestari et al., 2025). Studies in Indonesian classrooms report that students struggle with grammar, vocabulary, and idea development when writing descriptive and narrative texts (Guna et al., 2025; Hafizah et al., 2024; Nurlatifah & Yusuf, 2022; Yuniar & Siswana, 2024). Appropriate instructional support is therefore needed, and corrective feedback (CF), defined as responses to learners' language errors that guide them toward more accurate language use (Ellis, 2009), is one such strategy.

In writing, CF supports both language accuracy and text organization (Fadhly et al., 2025), directs attention to linguistic form, and may enhance metalinguistic awareness (Bitchener & Ferris, 2012). Studies in EFL contexts report that written CF can improve grammatical accuracy, vocabulary selection, and text organization (Elfiyanto & Fukazawa, 2021; Ferris, 1999) as well as writing efficiency (Wei & Cao, 2020, as cited in Dewi et al., 2023). For students, CF is both an error-correction tool and a form of instructional scaffolding (Elsayed & Hassan, 2020), although its effectiveness depends on how it is delivered and received.

CF can now be delivered in digital and non-digital modes. Non-digital CF comprises traditional teacher practices such as face-to-face comments, marking sheets, and handwritten

feedback (Henderson et al., 2019). It allows contextual, interactive guidance, but in senior high schools it is often constrained by large classes, limited time, and delays (Hyland & Hyland, 2006; Lee, 2017). Digital CF is conveyed through audio recordings, electronic comments, learning management systems, collaboration tools, automated writing evaluation, and AI-assisted applications (Henderson et al., 2019; Schindler et al., 2017), and has been reported to enable faster and more consistent responses than conventional feedback (Ranalli et al., 2017; Zhai & Ma, 2022).

From an SLA perspective, CF is considered a key mechanism for development. The Noticing Hypothesis (Schmidt, 1990) holds that negative evidence may help learners notice the gap between their interlanguage and the target language, allowing corrective information to become intake. Interactionist accounts treat CF as negative evidence that supports L2 development (Long, 1996), and the Output Hypothesis suggests that revising a text in response to feedback pushes learners to process language more deeply and to test hypotheses about it (Swain, 2005). Sociocultural theory (Vygotsky, 1978) adds that learning is shaped by interaction with more knowledgeable others within the Zone of Proximal Development (ZPD), so CF is a form of mediation whose success depends on learners' ability to perceive and use it (Lantolf & Thorne, 2006). Neither digital nor non-digital CF can therefore be assumed to be superior, and recent research points to possible complementary roles (Zhang & Hyland, 2022).

Research on CF in EFL writing is abundant, but studies have tended to examine a single feedback mode and have paid little attention to how digital and non-digital CF compare or complement each other. A considerable share of the research on digital feedback has been conducted at the tertiary level (e.g., Elsayed & Hassan, 2020), research at the Indonesian senior high school level appears more limited, and reviews that situate CF within SLA theory remain limited. This study therefore presents a systematic literature review of empirical research on the efficacy of digital and non-digital CF in Indonesian senior high school EFL writing. It synthesizes evidence on writing accuracy, revision behavior, and engagement, appraises the quality of that evidence, and interprets the findings through SLA theories. Four research questions guide the review:

RQ1. What are the characteristics (design, participants, and feedback mode) of the empirical studies?

RQ2. What does the evidence indicate about the effects of digital and non-digital CF on writing accuracy, revision behavior, and engagement, and how strong is it?

RQ3. How do the findings for digital, non-digital, and hybrid CF compare?

RQ4. To what extent can the findings be interpreted through SLA theories?

METHOD

Design and search strategy

This study is a systematic literature review (SLR) reported according to PRISMA 2020 (Page et al., 2021) and guided by the four research questions above. Records for 2015–2025 were retrieved from Google Scholar through Publish or Perish, which was selected because it indexes many national and regional journals that publish Indonesian EFL classroom research. Two search strings were used: (1) "writing" AND "corrective feedback" AND (digital OR manual OR

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traditional) AND Indonesia; and (2) “corrective feedback” AND “senior high school” AND writing AND Indonesia. The searches were last run in January 2026. Google Scholar offers limited Boolean control and is not recommended as a principal search system for systematic reviews (Gusenbauer & Haddaway, 2020); this limitation is addressed in the Limitations subsection.

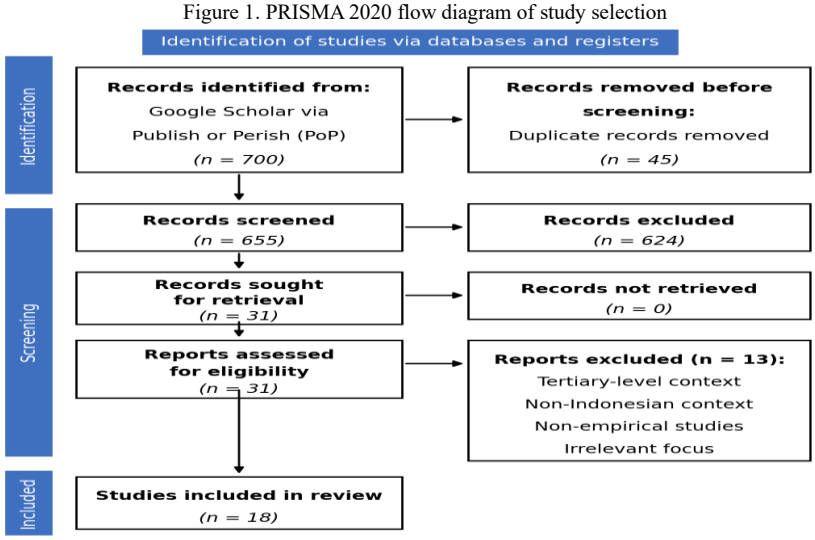
Eligibility criteria and study selection

The eligibility criteria are summarized in Table 1. Senior high school includes general, Islamic, and vocational schools. Digital CF refers to feedback delivered or mediated by technology (e.g., AI tools and online collaborative platforms), non-digital CF to teacher or peer feedback on paper or face to face, and hybrid CF to a combination of both. The searches returned 700 records. After 45 duplicates were removed, 655 titles and abstracts were screened and 624 records were excluded. Of the 31 full-text reports assessed, 13 were excluded because they concerned tertiary-level or non-Indonesian contexts, non-empirical designs, or an irrelevant focus, leaving 18 studies (Figure 1). The first author screened all titles, abstracts, and full texts against the criteria in Table 1 and extracted the data using a standardized coding form; the second author checked the included studies and the coding, and disagreements were resolved through discussion. No review protocol was registered.

Table 1. Eligibility criteria

Element	Inclusion	Exclusion
Population	EFL students in Indonesian senior high schools	Tertiary-level learners; non-Indonesian or ESL contexts
Phenomenon	Written feedback on EFL writing in digital, non-digital, or hybrid mode	Other language skills; no feedback component
Outcomes	Writing accuracy or quality, revision behavior, or engagement (including perceptions)	None of these outcomes
Design	Empirical studies (quantitative, qualitative, or mixed) with sufficient methodological detail	Conceptual papers, literature reviews, theses, dissertations
Publication	Peer-reviewed journal articles or conference proceedings, 2015–2025	Other periods; non-peer-reviewed sources

Figure 1. PRISMA 2020 flow diagram of study selection



Coding, quality appraisal, and synthesis

For each study, the design, participants, feedback mode, and main findings were extracted. Outcomes were coded as writing accuracy (scores and error reduction), revision behavior (how

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students act on feedback), or engagement (motivation, confidence, anxiety, preference, and participation), and as performance data (scores or error counts) or perception and descriptive data. Quality was appraised with a checklist adapted from the Mixed Methods Appraisal Tool (Hong et al., 2018): (A) the design is explicit and suited to the aim; (B) sample size and context are reported; (C) the design allows change or difference to be examined (control or comparison group, repeated measures, or cycles); and (D) outcomes include performance data rather than perceptions alone. Each criterion was rated yes, partly, or no. Confidence in the evidence for effectiveness was rated higher when B, C, and D were all met, moderate when C and D were each at least partly met, and lower otherwise. Lower ratings reflect the limited inferences a design permits about effectiveness, not poorer research, and no study was excluded on this basis. The findings were synthesized narratively (Popay et al., 2006): studies were grouped by feedback mode and compared within each outcome, weighting the evidence by type and rating. SLA theories were applied afterwards as an interpretive lens.

FINDINGS AND DISCUSSION

The 18 studies are presented by characteristics and quality (RQ1), outcome (RQ2), comparison between modes (RQ3), and SLA interpretation (RQ4). Study identifiers (S1–S18) are used in the tables.

1. Characteristics and Quality of the Included Studies

The studies were published between 2017 and 2025, nine of them in 2024–2025 (Table 2). Eleven examined non-digital CF (direct, indirect, coded, minimal-marking, and peer feedback), six examined digital CF (four on AI tools such as ChatGPT and Grammarly, two on Google Docs), and one examined a hybrid approach; all digital studies appeared from 2021 onward. Six studies were experimental or quasi-experimental, one was classroom action research, three used mixed methods, and eight were qualitative or descriptive. Samples ranged from 3 to 64 students where reported, and seven studies did not report sample size. Five studies, all on non-digital CF, were rated higher confidence, four moderate, and nine lower, including all four AI studies and the Google Docs case study, largely because of descriptive designs, perception-based outcomes, and missing sample information.

Table 2. Characteristics and quality appraisal of the included studies

Study	Design and participants	Feedback mode	Main findings	Quality (A–D)
S1 Saukah et al. (2017)	Experimental, repeated measures; 53 Grade XI students	Non-digital: coded vs. non-coded	Coded CF gave significantly better overall writing quality.	Higher (YYYY)
S2 Kamilia et al. (2020)	Quasi-experimental; 52 students (science and social classes)	Non-digital: indirect	Descriptive-text scores rose significantly (62.84 to 79.97).	Higher (YYYY)
S3 Damayanti et al. (2021)	Qualitative case study; 6 students	Digital: Google Docs (peer)	Comments and chat supported peer negotiation and text organization.	Lower (YYNN)
S4 Gunawan et al. (2020)	Quasi-experimental; 56 Grade XI students	Non-digital: indirect	Experimental class outperformed control (64.71 vs. 58.25).	Higher (YYYY)
S5 Warni (2021)	Descriptive; senior high students, West Sumatra (n not reported)	Non-digital: direct and indirect	59% preferred direct CF; 54% felt indirect CF aided noticing of mechanics.	Lower (YNNN)

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Study	Design and participants	Feedback mode	Main findings	Quality (A–D)
S6 Aprilia et al. (2022)	Classroom action research; 24 Grade XI students	Non-digital: indirect	Performance improved across cycles as students learned to identify errors.	Moderate (YYPY)
S7 Anggunsari & Wahyuni (2023)	Quasi-experimental; 56 tenth-grade students	Non-digital: direct	Medium-level effect on accuracy in recount texts.	Higher (YYYY)
S8 Utami et al. (2023)	Mixed-methods case study; three schools (n not reported)	Digital: AI platforms	Aided planning and drafting and raised interest, but not all quality indicators improved.	Lower (YNNN)
S9 Sari & Daulay (2023)	Qualitative descriptive; 64 Grade XI students	Non-digital: direct vs. indirect	Science-class teachers favored direct CF; social-class teachers used indirect CF.	Lower (YYNN)
S10 Gaffar et al. (2024)	Quasi-experimental, control group; 43 vocational students	Non-digital: peer	Improved hortatory exposition writing and motivation.	Higher (YYYY)
S11 Syahriyanti et al. (2024)	Descriptive qualitative; three schools (n not reported)	Digital: AI tools	Vocabulary and fluency gains; risks of overload and dependence.	Lower (YNNN)
S12 Afreilyanti & Kuswandono (2024)	Explanatory mixed methods; 32 students	Non-digital: direct vs. metalinguistic	Direct CF preferred; CF seen as supporting self-regulated learning.	Lower (YYNN)
S13 Pratama & Hastuti (2024)	Qualitative descriptive; EFL students (n not reported)	Digital: AI tools	Reported accuracy gains via real-time correction and vocabulary suggestions.	Lower (YNNN)
S14 Angin et al. (2025)	Qualitative case study; 3 students (low, average, high proficiency)	Non-digital: direct	Fewer errors in six categories, mainly for mid- and high-proficiency learners.	Moderate (YPPY)
S15 Nugroho et al. (2025)	Descriptive qualitative; Grade X students and teachers (n not reported)	Non-digital: minimal marking	Effective, time-saving, and easy to understand.	Lower (YNNN)
S16 Zahrok & Rahmawati (2025)	Quasi-experimental; two Grade X classes (n not reported)	Digital: collaborative Google Docs	Collaborative writing outperformed individual writing.	Moderate (YNYY)
S17 Harahap & Uswar (2025)	Descriptive qualitative; students (n not reported)	Digital: Grammarly	Lower anxiety and higher confidence; risk of over-reliance.	Lower (YNNN)
S18 Lestari et al. (2025)	Explanatory mixed methods; 60 students	Hybrid: automated plus teacher	Greater improvement; automated for mechanics, teacher for coherence.	Moderate (YYPY)

Note. A = design explicit and suited to the aim; B = sample size and context reported; C = control or comparison group, repeated measures, or cycles; D = performance data. Y = yes, P = partly, N = no.

2. Corrective Feedback and Writing Accuracy

Non-digital CF has the largest and strongest evidence base. Higher-confidence studies found better overall writing quality with coded than non-coded feedback (Saukah et al., 2017), significant score gains after teachers' indirect feedback (Gunawan et al., 2020; Kamilia et al., 2020), a medium-level effect of direct written CF on accuracy (Anggunsari & Wahyuni, 2023), and improved writing after peer CF (Gaffar et al., 2024). Moderate-confidence studies agree: Aprilia et al. (2022) reported improvement across action-research cycles, and Angin et al. (2025) reported fewer errors among three students, although low-proficiency learners needed extra scaffolding. Two caveats apply. Most outcomes are overall writing scores rather than error-specific accuracy, and direct and indirect CF were studied separately, so they are compared only through preferences (Afreilyanti & Kuswandono, 2024; Sari & Daulay, 2023; Warni, 2021). The evidence therefore cannot show that indirect or coded feedback outperforms direct feedback, or that effects are long-lasting, as no study appears to have used delayed post-tests.

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Evidence for digital CF is thinner. The only comparative design (Zahrok & Rahmawati, 2025) found that collaborative writing in Google Docs outperformed individual writing, but this contrast does not isolate feedback. Damayanti et al. (2021) reported, in a six-student case study, that Google Docs comments supported peer negotiation and text organization. AI studies are descriptive: participants reported improved accuracy through real-time correction (Pratama & Hastuti, 2024) and gains in vocabulary and fluency (Syahriyanti et al., 2024), whereas Utami et al. (2023) found that AI tools did not improve all quality indicators of academic writing, suggesting a continuing need for human guidance. These are reported rather than measured benefits, and "significant improvement" in descriptive designs cannot be read statistically. The hybrid study (Lestari et al., 2025) reported greater improvement when automated feedback on mechanics was combined with teacher feedback on coherence and argumentation, but it is a single mixed-methods study. Overall, non-digital CF is linked to measured gains, digital CF to perceived benefits and one comparative gain in collaborative writing, and no study compared the two modes directly; claims of superiority for either mode are unwarranted.

3. **Corrective Feedback and Revision Behavior**

Direct evidence on revision behavior is limited in both modes. Claims that indirect, coded, or minimal-marking feedback promotes active revision (Gunawan et al., 2020; Kamilia et al., 2020; Nugroho et al., 2025; Saukah et al., 2017) are mostly inferred from scores or perceptions rather than observed revision. Aprilia et al. (2022) offer the clearest evidence, reporting that students learned to identify their own errors across cycles, and Gaffar et al. (2024) report interactive learning in peer CF. In digital settings, Google Docs comments were reported to facilitate peer dialogue (Damayanti et al., 2021), and participants described AI tools as supporting independent self-correction (Harahap & Uswar, 2025; Pratama & Hastuti, 2024; Syahriyanti et al., 2024). However, Utami et al. (2023) indicated that effort shifted toward planning and drafting, and two studies warn that over-reliance may weaken critical awareness (Harahap & Uswar, 2025; Syahriyanti et al., 2024). Accepting suggestions may differ from diagnosing errors, a distinction that no study examines directly. The hybrid study reported self-regulated revision cycles (Lestari et al., 2025).

4. **Corrective Feedback and Student Engagement**

Evidence on engagement comes mostly from perceptions and preferences. Direct CF was described as clear and reassuring and indirect CF as more challenging (Afreilyanti & Kuswandono, 2024; Sari & Daulay, 2023; Warni, 2021), minimal marking as easy to understand (Nugroho et al., 2025), and peer CF was associated with higher motivation (Gaffar et al., 2024). Angin et al. (2025) show that responses to direct CF vary with proficiency. For digital CF, Grammarly was reported to reduce anxiety and increase confidence (Harahap & Uswar, 2025), AI tools to raise interest (Utami et al., 2023), and Google Docs to enable peer interaction (Damayanti et al., 2021; Zahrok & Rahmawati, 2025), although over-reliance and the need for AI

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literacy were noted (Harahap & Uswar, 2025; Syahriyanti et al., 2024; Utami et al., 2023). Students in the hybrid study were more motivated when they valued both automated speed and teacher expertise (Lestari et al., 2025). Both modes thus show favorable engagement, but mainly through self-report, and no study shows that engagement mediated writing gains. The risks differ: clarity and fit with proficiency for non-digital CF, over-reliance for digital CF.

5. Comparison of Digital and Non-Digital CF and SLA Interpretation

Table 3 compares the modes across outcomes. The evidence base is asymmetrical: non-digital CF accounts for 11 of the 18 studies and all five higher-confidence studies, whereas digital CF accounts for six studies, all since 2021 and mostly descriptive. Non-digital studies mostly test a feedback type, whereas digital studies examine tools or platforms in which feedback is often not isolated. The modes thus appear to differ in what they offer rather than in how well they work: immediacy, privacy, and peer interaction in digital CF, and contextualized teacher guidance in non-digital CF. This supports a rationale for hybrid approaches, which remain under-researched.

Table 3. Comparative synthesis of digital and non-digital CF by outcome

Outcome	Non-digital CF	Digital CF	Hybrid CF	Comparative reading
Writing accuracy	Gains in seven studies (S1, S2, S4, S6, S7, S10, S14), five rated higher confidence; direct vs. indirect compared only through preferences.	One comparative study (S16; feedback not isolated); perceived accuracy gains (S11, S13); limited effect on higher-level quality (S8).	Greater improvement (S18); automated feedback for mechanics, teacher for coherence.	Stronger evidence for non-digital CF; digital evidence thinner and perception-based. Confidence: moderate vs. low.
Revision behavior	Mostly inferred from scores (S1, S2, S4, S15); learners identified errors across cycles (S6).	Peer dialogue (S3); self-correction reported (S11, S13, S17); effort shifted to drafting (S8).	Self-regulated revision cycles (S18).	Little direct evidence in either mode. Confidence: low.
Engagement	Preference, clarity, motivation (S5, S9, S10, S12, S15); proficiency-dependent response (S14).	Lower anxiety, confidence (S17); interest (S8); peer interaction (S3, S16); over-reliance (S11, S17).	Higher motivation (S18).	Favorable in both modes, mainly self-report. Confidence: low.

The findings are compatible with the Noticing Hypothesis (Schmidt, 1990) and the Output Hypothesis (Swain, 2005) for coded, indirect, and direct feedback, with sociocultural theory (Vygotsky, 1978; Lantolf & Thorne, 2006) for peer and collaborative feedback, and with Krashen's (1982) Affective Filter Hypothesis for AI feedback that reduced anxiety. The strength of these links varies. Noticing is plausible but was inferred from outcomes or perceived noticing (Warni, 2021) rather than process data; the Output link is weak because revision processes were rarely observed; the sociocultural link is moderately plausible given reported peer interaction, although the ZPD was not operationalized and Zahrok and Rahmawati (2025) combine collaboration with feedback; and the Affective Filter link rests on one descriptive study (Harahap & Uswar, 2025). Compatibility is not confirmation: other mechanisms, such as time on task or teacher attention, could explain the same results, and no study measured the theoretical constructs directly. Self-regulated learning and autonomy, invoked by several studies (Afreilyanti & Kuswandono, 2024; Lestari et al., 2025; Pratama & Hastuti, 2024; Syahriyanti et al., 2024), derive from educational psychology (Zimmerman, 2002) and are treated here as complementary.

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6. **Limitations**

Several limitations apply. The primary evidence consists of small samples (3–64 students where reported), seven studies without reported sample size, only five higher-confidence studies, and outcomes ranging from writing scores to questionnaires, which prevents pooling; some digital studies address AI writing support or collaborative writing more broadly, so feedback is not isolated. The review relied on a single source, Google Scholar through Publish or Perish (Gusenbauer & Haddaway, 2020), and its search strings omitted technology-specific terms (e.g., automated writing evaluation, Grammarly, ChatGPT, or Google Docs), so digital studies may have been under-retrieved. Theses and other grey literature were excluded, which may introduce publication bias. Selection, extraction, and appraisal were conducted by the authors without independent double-screening and without a registered protocol, which may increase selection and coding bias; the appraisal used an adapted checklist and reflects what the articles report; and a narrative synthesis cannot estimate effect sizes. Future reviews should search several databases (e.g., Scopus, ERIC, Web of Science, and SINTA-indexed journals), use technology-specific terms, involve two independent reviewers, and be complemented by experimental studies that compare digital and non-digital CF directly with delayed post-tests.

CONCLUSION

This review synthesized 18 empirical studies on digital and non-digital CF in Indonesian senior high school EFL writing. The evidence base is dominated by non-digital CF (11 studies), with six digital studies, all since 2021, and one hybrid study; the five studies rated higher confidence all concern non-digital CF (RQ1). Higher-confidence studies associate non-digital CF (coded, indirect, direct, and peer feedback) with gains in writing performance, whereas evidence on digital CF (AI tools and Google Docs) rests mostly on perceptions and small descriptive studies; evidence on revision behavior is limited in both modes, and evidence on engagement is mainly self-reported (RQ2). No study compared digital and non-digital CF directly, so neither mode can be declared more effective; the modes appear to offer different strengths, and a hybrid approach is promising but supported by a single study (RQ3). The findings are compatible with Noticing, Output, sociocultural, and Affective Filter perspectives, but these links are interpretive (RQ4).

For practice, teachers may match feedback type to learners' proficiency and the writing task, use coded or minimal-marking feedback when time is limited, and prepare students to evaluate rather than simply accept AI suggestions. For research, experimental studies that compare digital, non-digital, and hybrid CF directly, include delayed post-tests, and observe revision and noticing through process data are needed, together with reviews that draw on additional databases.

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