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A Systematic Review of Written Corrective Feedback and Dynamic Written Corrective Feedback Research in ESL/EFL Contexts

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Abstract
Over the past fifteen years (2010–2026), research on written corrective feedback (WCF) and dynamic written corrective feedback (DWCF) in ESL/EFL contexts has expanded rapidly. Following Petticrew and Roberts' s (2008) seven-stage framework, this review synthesizes 54 primary studies through content analysis, identifying 41 word-level concepts grouped into six themes: types of feedback, research design, writing process, participants and educational contexts, types of errors, writing performance. Results show that direct WCF remains most frequently examined, while indirect and metalinguistic forms are less common and often combined. More recent studies highlight growing attention to computer-mediated feedback and DWCF. Research designs were dominated by pre-post and post-test quasi-experiments, with fewer mixed-methods and qualitative studies. In addition, both WCF and DWCF consistently improved accuracy and psychological outcomes, while effects on complexity and fluency were mixed. Based on the systematic literature review, this study is expected to contribute more meaningful references and give some implications for future research.

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Introduction

Written Corrective Feedback (WCF) has long been recognized as an important pedagogical practice in second language (L2) writing instruction, and it plays a vital role in fostering learners' linguistic development. Nevertheless, Truscott (1996) challenged the effectiveness of error correction in language learning, and he has continued to refine this critique over the past years. Recently, the debate has shifted from effectiveness to validity by questioning whether existing WCF research actually addresses the questions it intends to address (Mohebbi, 2021; Truscott, 2023). Thus, the value of WCF has remained one of the most debated issues in L2 writing research. In the past fifteen years, the number of empirical studies on WCF has increased significantly, and its research focus have gradually expanded from accuracy improvement to complexity, fluency and learners' emotional factors.

Several scholars have attempted to review the key achievements and challenges of WCF research. However, most reviews adopted a narrative approach. While these reviews shed light on important aspects of WCF, unclear inclusion standards and insufficiently transparent procedures restricted the reliability of their findings (Gough et al., 2017; Grant & Booth, 2009). In recent years, with the increasing of systematic review methodologies and text-mining tools in educational research, there has been a stronger emphasis on synthesizing WCF studies through more scientific and reproducible approaches. By applying these methods, researchers can systematically map key themes and track emerging trends. They also help to reveal unresolved issues and provide more concrete directions for future studies.

Moreover, Dynamic Written Corrective Feedback (DWCF), a rising research topic in recent ten years, has gradually become an important extension of WCF research. Different from the traditional WCF, DWCF emphasizes the continuous and cyclic feedback and revision process in a short period with immediacy and interactivity. Since Hartshorn et al. (2010) put forward this concept, the related research has gradually expanded to different learners' groups and teaching situations, which examines the effects of DWCF on accuracy, complexity and fluency in various contexts. However, at present, the research of DWCF is still in the development stage, and there is a lack of literature review on systematic comparison and integration with WCF.

Therefore, this study systematically reviewed 54 empirical studies published from 2010 to 2026, including 38 WCF studies and 16 DWCF studies. The purpose of this paper is as follows: Firstly, to investigate the main characteristics of WCF and DWCF research in design and methods; Secondly, to analyze the effects of WCF and DWCF in writing performance and other areas. Through systematic review, this study not only aims to reveal the current state and shortcomings of WCF and DWCF research, but also hopes to provide enlightenment for future theoretical studies and teaching practice.

Literature Review

WCF is commonly used by teachers to correct learners' linguistic errors and to guide their revision practices. However, the role and effectiveness of WCF have remained controversial in the field of L2 writing. On the one hand, Truscott (1996) held that the effect of correcting grammatical errors is limited, even with negative effects on second language writing. On the other hand, Ferris (2010) pointed out that corrective feedback can improve learners' writing ability when it is used properly. Despite the controversy, a large number of theoretical research, empirical research and literature review have shown that WCF has a significant and lasting positive effect on writing accuracy (Bitchener & Knoch, 2010a, 2010b; Bitchener & Storch, 2016; Brown et al., 2023; Chong, 2019; Diab, 2023; Sheen, 2010). Some recent research further illuminates the effects of WCF. For instance, Mahmood and Aziz (2023) advocated that explicit WCF significantly improved subject-verb agreement among EFL undergraduates. Direct and indirect comprehensive feedback enhanced non-grammatical accuracy in revisions, yet showed no transfer to new writing (Karim, 2024).

Teacher cognition has emerged as a critical dimension in WCF research. Lee and Mohebbi (2020) emphasized that teachers' knowledge, beliefs, and practices profoundly influence feedback implementation and student uptake. Furthermore, Yang et al. (2021) found that educators acknowledged feedback as a shared responsibility, and they expressed limited confidence in students' capacity for autonomous learning. This contrasts with the university-level case study by Lira-Gonzales et al. (2021), in which beliefs and practices were highly aligned, with a preference for comprehensive indirect error coding feedback combined with assessment rubrics. Also, the curricular, process-oriented ISLA approach is advocated to situate WCF within authentic language programs and bridges between researcher and teacher (Leow, 2023). Overall, these studies highlight different perceptions of student autonomy between K-12 and university settings, underscoring the urgent need for targeted teacher training to minimize the belief-practice gap and enhance the effectiveness of WCF in authentic classrooms.

On the basis of WCF, DWCF, as a teaching strategy emphasizing circular feedback and learners' active participation, has gradually attracted attention among scholars in second language writing. A number of studies focused on the effects of DWCF on writing accuracy (e.g. Evans et al., 2011; Kurzer, 2018a; Rassaei, 2021), while some studies indicated more comprehensively that DWCF plays an active role in improving the writing accuracy, fluency and complexity of learners at different levels and ages (e.g. Deghatkar et al. , 2023; Liu & Xu, 2023; Sayad et al., 2022). However, several studies argued that DWCF is effective in accuracy, but it has limited effect in rhetorical quality, complexity and fluency (Hartshorn et al., 2010; Hartshorn & Evans, 2015).

In order to sort out the research trend of WCF, Chong (2019) systematically reviewed 41 WCF papers published from 1997 to 2017, and they were analyzed from the dimensions

of WCF type, writing task type, participants, research design/method, and error types. The findings showed that writing tasks of different lengths and types were involved in WCF strategies, and most studies adopted the quasi-experimental design to verify the effectiveness of various WCF strategies. In addition, Brown et al. (2023) used Bayesian method to make a meta-analysis of 50 WCF studies and distinguished short-term, medium-term and long-term effects, indicating that WCF has positive effects and persistent characteristics. Moreover, the bibliometric analysis of 321 articles by Liu (2025) revealed an exponential increase in WCF publications, with major themes shifting toward student engagement, teacher practices, perceptions, motivation, and theoretical foundations. Since DWCF was put forward by Harshorn et al. in 2010, there have been few systematic literature reviews in this field. Kurzer (2023) carried out a scoping review of DWCF studies in different contexts, concluding that DWCF is beneficial to improving writing performance, especially in accuracy and fluency. This model also flexibly adapted to the needs of different student groups and teaching projects. Existing reviews have outlined trends in WCF or DWCF, but methodological limitations remain prevalent, such as design limitations, neglect of contextual variables or teacher belief, leading to low ecological validity and insufficient attention to curricular integration (Reinders & Mohebbi, 2018).

Although several reviews have attempted to summarize WCF or DWCF studies, there are some limitations in the previous literature reviews. Common issues include the literature coverage, inclusion standards, the small sample size of studies, or the unclear screening process, all of which affect the comprehensiveness of the results. Moreover, past studies showed differences in feedback types, research design, learners' background and measurement methods among different studies, but these differences have not been effectively integrated by grouping analysis or other methods, thus reducing the comparability of research results and weakening the reliability and generalization of conclusions to some extent. Additionally, some reviews employed a single-dimension focus on the accuracy of writing, lacking systematic discussion on complexity, fluency and long-term transfer effect.

In view of these gaps, this study synthesizes the empirical studies of WCF and DWCF published between 2010 and 2026. The transparent screening process is presented, and the included studies are coded and classified in a multi-dimensional way by combining thematic analysis and grouping, so as to reveal the research patterns and differences more systematically. Statistical methods are used to conduct a comprehensive systematic review and comparative analysis of WCF and DWCF. This "two-tier" review design not only depicts the macro picture of WCF research, but also demonstrates the uniqueness of DWCF in implementation characteristics, effect mode and situational adaptability, thus providing more targeted and operational evidence support for the theoretical development and practical application of written corrective feedback.

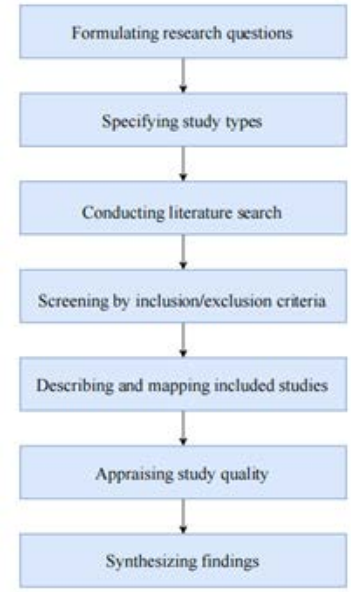
Method

Systematic literature review is a protocol-driven and quality-focused approach that features a rigorous structure, comprehensiveness, and reproducibility (Bearman et al., 2012). Unlike traditional reviews, it minimizes researcher bias through predefined inclusion and exclusion criteria, thereby ensuring the objectivity and transparency of literature screening and synthesis (Pae, 2015). Moreover, systematic reviews provide reliable evidence for both research and practice and facilitate the effective transformation of research findings into policy-making and educational applications (Bearman et al., 2012).

Specifically, this study adapts the seven steps for systematic literature review by Petticrew and Roberts (2008). Given the strict inclusion and exclusion criteria applied in the selection process, all included studies already met the minimum methodological quality standards. Therefore, a separate quality appraisal stage was not conducted, and six steps for systematic literature review were employed in the present study. The first step is formulating research questions, which clearly defines the focus and scope of the review. Secondly, specifying study types to ensure the methodological consistency of the review in research design and methodological characteristics. The third step involves conducting a comprehensive literature search across multiple databases to minimize bias. Then, the studies are screened according to the inclusion and exclusion criteria, ensuring their relevance to the research questions. Fifthly, describing and mapping included studies by comparing basic characteristics of the included studies and establishing the overall research map. Finally, the findings are synthesized through quantitative and qualitative method to summarize the research results into systematic conclusions.

Figure 1

Seven Steps for Systematic Literature Review (Petticrew & Roberts, 2008)



Formulating Research Questions and Specifying the Types of Studies

The study seeks to address the following research questions:

RQ$_1$: What types of feedback have been examined in the included WCF and DWCF studies?

RQ$_2$: What research designs have been used in the included WCF and DWCF studies?

RQ$_3$: What are the effects of WCF and DWCF on writing performance and psychological factors in the included studies?

Conducting Literature Search and Screening by Inclusion and Exclusion Criteria

In a systematic literature review, searching and screening the literature are essential steps for ensuring quality and objectivity (Bearman et al., 2012). By establishing and applying clear inclusion and exclusion criteria, researchers can sort through large amounts of studies and improve the relevance and comparability of included studies (Gough, 2007). After completing the search, the collected documents were reviewed step by step according to these standards, so as to maintain transparency and scientificity in the later analysis.

This systematic literature review selected three authoritative databases, Google Scholar, Web of Science, and Scopus as the sources of literature. For duplicate records, only one article was kept to avoid double counting and deviation. The literature search focused on the studies published between 2010 and 2026 so as to cover the latest research findings.

Literature search strategies and the selection of keywords play a fundamental role in carrying out a systematic literature review. Accordingly, an effective keyword search strategy was implemented during the literature retrieval process. Specifically, the main keywords were “Written Corrective Feedback”, “Dynamic Written Corrective Feedback”, and related variants and synonyms were “Feedback in Writing”, “Error Correction in Writing”, “Written Error Feedback”, “Dynamic Feedback in Writing”. Also, there were some keyword combination, such as “Written Corrective Feedback” OR “Written Error Feedback” OR “Error Correction in Writing” AND “quasi-experiment*” OR “experimental study” OR “intervention study” OR “pretest” OR “posttest” AND “EFL Students” OR “ESL Students” OR “L2 Writing” OR “Second Language Writing” OR “Foreign Language Writing” NOT “Oral Feedback” OR “English as First Language”.

Table 1

Inclusion and Exclusion Criteria for Literature Search

Category	Inclusion	Exclusion
Database	SSCI-indexed journals and peer reviewed journals (e.g., indexed in Scopus, ERIC, MLA)	All journals except SSCI-indexed journals and peer reviewed journals
Language	English	All languages except English
Document Type	Journal articles	Other document types (e.g., books, dissertations, conference papers, reports)
Years of Publication	2010-2026	Before 2010
Context of the Study	English as a second or foreign language	English as a first language
Focus of the Study	Written corrective feedback or dynamic written corrective feedback	Other types of corrective feedback (e.g., oral corrective feedback)
Research Design	Primary studies	Secondary studies (e.g., conceptual, descriptive, reviews)
Outcomes	Reported measurable learning outcomes and sufficient statistical information (e.g., outcomes available for both experimental and control groups)	No measurable outcomes and insufficient statistical data (e.g.,Outcomes reported for a single group only)
Availability	Records with full-text available	Records without full-text available

Table 1 presents the inclusion and exclusion criteria for the literature review. Time restriction is an important dimension to be included in the criteria, which helps to ensure the scientificity and relevance of the reviewed literature (Petticrew & Roberts, 2008). In this study, the literature search targeted primary studies on WCF published in SSCI-indexed journals and peer reviewed journals (e.g., ERIC, MLA) from 2010 to 2026. The reason for choosing 2010 as the starting point is that this year marks the emergence of DWCF, which represents a significant development in the WCF research agenda. Moreover, all included studies should be written in English from journal articles. Thus, books, dissertations, conference papers, reports and other document types were excluded.

In terms of the context of the study, the review focused on English as a second language (ESL) or English as a foreign language (EFL) corresponding to the research topic. Primary studies on WCF or DWCF were included, while other types of feedback, such as oral corrective feedback, were excluded to confirm the consistency between research questions and literature. In addition, conceptual studies (e.g., Lee, 2020), systematic reviews (e.g., Mao & Lee, 2020), meta-analysis reviews (e.g., Brown et al., 2023; Mohsen, 2022) were also not included. As for research results, this review only included studies that reported measurable results with sufficient statistical information. Regarding the availability of literature, the scope of review was limited to the records of the full text to ensure the integrity and depth of analysis.

Describing and Mapping Included Studies

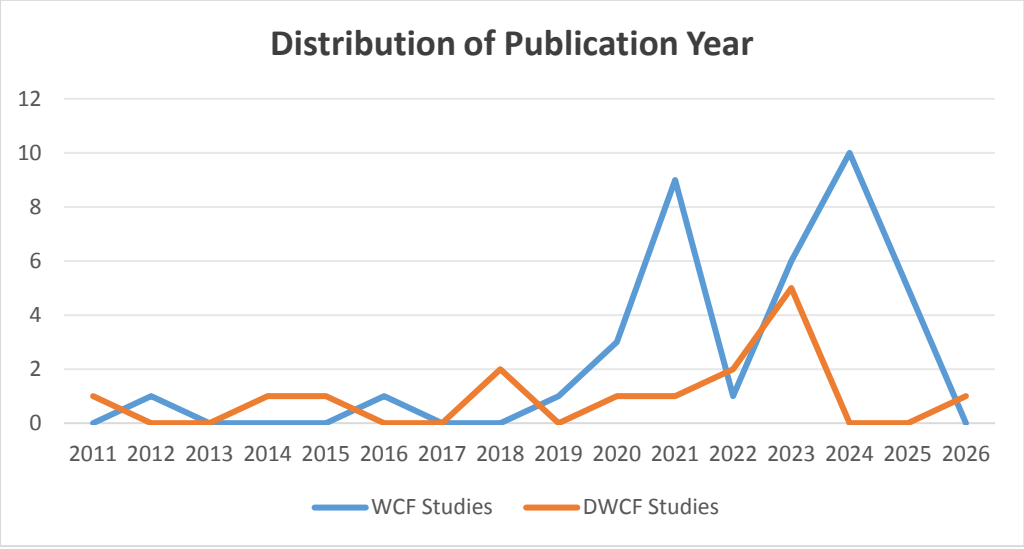
Following the mentioned inclusion and exclusion criteria in Table 1, a total of 54 studies were included in this study. Appendix 1 presents specific information of the studies from the perspective of author, publication year, independent variables, dependent variables, participants, country, methods and findings.

With regard to the publication year, the included studies were distributed from 2010 to 2026. As illustrated in the figure 3, the included WCF and DWCF studies presented an overall upward trend during this period. In the initial 9 years, WCF studies were sporadic, with at most one publication per year. However, after 2019, WCF research output rose sharply and reached a first peak in 2021 with 9 publications. The following year saw a significant drop to only one study in 2022, but the number began to climb again in 2023 with 6 studies and reached another peak in 2024 with 10 publications. So far in 2026, only four studies have been identified, but this figure may increase as more articles are published later in the year. The whole growth trend shows that WCF continues to attract scholarly attention, and it also indicates that researchers are exploring its effectiveness through new methodological and theoretical perspectives.

As for DWCF, it was first introduced in 2010. The number of DWCF studies was limited from 2010 to 2022, with no more than two articles per year. Notably, the year of 2023 witnessed the highest record with 5 articles. No further studies were recorded in 2024 or in 2025 and only 1 study published in 2026, suggesting that DWCF research has not yet developed a stable publication pattern despite its growing recognition in recent years. When compared with WCF, which has maintained a more consistent rise in output since 2019, DWCF saw a short-lived but notable surge between 2020 and 2023. This overlap reveals that L2 writing research has begun to expand from traditional written error correction toward more dynamic and interactive feedback practices.

Figure 2

Distribution of Publication Year



The 54 included primary studies were distributed across both SSCI-indexed journals and other peer-reviewed journals, with a concentration in leading journals such as Computer Assisted Language Learning, Language Teaching Research, and Journal of Second Language Writing. More specifically, 39 included studies were from SSCI-indexed journals and 15 studies were from other peer-reviewed journals. The increasing WCF and DWCF research in high-impact journals reflects their importance and academic recognition. In addition, the publishing platform presents a diversified trend, including both mainstream international journals and regional peer-reviewed journals. It helps to strengthen international academic influence while also addressing regional educational contexts and practical needs, thereby advancing both the theoretical development and practical application of WCF and DWCF research.

Table 2

Included Primary Studies in SSCI-indexed Journals and Peer-Reviewed Journals

SSCI-Indexed Journals	Included Primary Studies
Computer Assisted Language Learning	1. Barrot (2023)
	2. Reynolds & Kao (2021)
	3. Imsa-ard & Barrot (2024)
Language Teaching Research	4. Benson & DeKeyser (2019)
	5. Karim & Nassaji (2020)
	6. Kim & Emeliyanova (2021)
	7. Tabari, Sato, & Wang (2023)
	8. Lira-Gonzales, Nassaji, De Tejeda, Vasquez, & Saenz (2024)
Journal of Second Language Writing	9. Lee, Luo, & Mak (2021)
	10. Bitchener & Knoch (2010)
RELC Journal	11. Linh Hoang (2024)
	12. Lee, Luo, & Mak (2023)
	13. Eckstein & Bell (2023)
	14. Hartshorn & Pack (2026)
Journal of Psycholinguistic Research	15. Sang & Zou (2023)
Assessing Writing	16. Mujtaba, Reynolds, Parkash, & Singh (2021)
	17. Alshahrani & Storch (2025)
	18. Kim & Hiver (2025)
System	19. An & Li (2025)
	20. Evans, Hartshorn, & Strong-Krause (2011)
Journal of Computer Assisted Learning	21. Hassanzadeh & Fotoohnejad (2021)
International Review of Applied Linguistics in Language Teaching	22. Rassaei (2021)
TESOL Quarterly	23. Hartshorn, Evans, Merrill, Sudweeks, Strong-Krause, & Anderson (2010)
	24. Kurzer (2018a)
SAGE Open	25. Wei & Cao (2020)
	26. Fan (2023)
	27. Gebremariam (2024)
Language learning	28. Van Beuningen, De Jong, & Kuiken (2012)
Teaching in Higher Education	29. Zheng, Yu, & Liu (2023)
Education and Information Technologies	30. Rahimi, Fathi, & Zou (2024)
Educational Technology & Society	31. Chen (2024)
Heliyon	32. Wondim, Bishaw, & Zeleke (2024)
Humanities and Social Sciences Communications	33. Kao & Reynolds (2024)
Journal of Educational Computing Research	34. Alsofyani & Barzanji (2025)

Journal of English for Academic Purposes	35. Zhang & Cheng (2021)
Sustainability	36. Cheng & Zhang (2021)
The Asia-Pacific Education Researcher	37. Cheng & Zhang (2024)
	38. Reynolds, Kao, & Huang (2021)
International Journal of Applied Linguistics	39. Sinha & Nassaji (2022)
Other Peer-Reviewed Journals	**Included Primary Studies**
Biannual Journal of Education Experiences	40. Deghatkar, Khodareza, & Valipour (2022)
Foreign Language Studies	41. Hartshorn, Rice, Eckstein, & Evans (2023)
3L: Language, Linguistics, Literature	42. Ganapathy, Tan, & Phan (2020)
International Journal of Applied Linguistics and English Literature	43. Kamalian & Lashkarian (2014)
Journal of Global Economy	44. Liu & Xu (2023)
Journal of Language and Education	45. Kendon (2022)
Journal of Response to Writing	46. Hartshorn & Evans (2015)
	47. Kurzer (2018b)
Journal of Studies in Learning and Teaching English	48. Deghatkar, Khodareza, & Valipour (2023)
TESL Canada Journal	49. Eckstein, Sims, & Rohm (2020)
Language Teaching Research Quarterly	50. Mahmood & Aziz (2023)
Frontiers in Education	51. Almohawes (2025)
Language Testing in Focus: An International Journal	52. Karim (2024)
Jurnal Pendidikan Bahasa dan Sastra UPI	53. Kisnanto (2016)
Revista científica de educación y comunicación	54. Torres & Mihai (2023)

Synthesizing Findings

After identifying 54 studies for inclusion in this systematic review, all abstracts were collected into a document, and then text mining was conducted based on the abstracts to identify study-related high-frequency words occurring at least 20 times. Figure 4 displays word-level concepts in terms of count and relevance, on the basis of which six thematic categories of Types of Feedback, Research Design, Writing Process, Participants and Educational Settings, Types of Errors and Writing Performance were summarized (see Table 3).

According to the distribution of word frequency and relevance, the core concepts in the research field are highly concentrated on “feedback” and “writing”. The words “group”, “student” and “WCF” rank among the most frequent items as well. Words related to research methods such as “experimental”, “treatment”, “result” and “research” also appear frequently, which shows that the research design of the experimental group and the control group is usually adopted.

Notably, three dimensions of writing performance, namely accuracy, complexity and fluency are all included in the word-level concepts figure, with frequency ranking from accuracy to complexity, and then to fluency. Additionally, words including “teacher”, “learner”, “participant” and “university” highlight that some studies focus on the higher education classroom, and the interaction between teachers and students is an important research dimension. Furthermore, the frequency of “dynamic” and “DWCF” reveals that dynamic written error correction feedback has gradually entered the research field, but DWCF has received comparatively less attention than traditional WCF.

Figure 3

Word-Level Concepts (Count+Relevance)

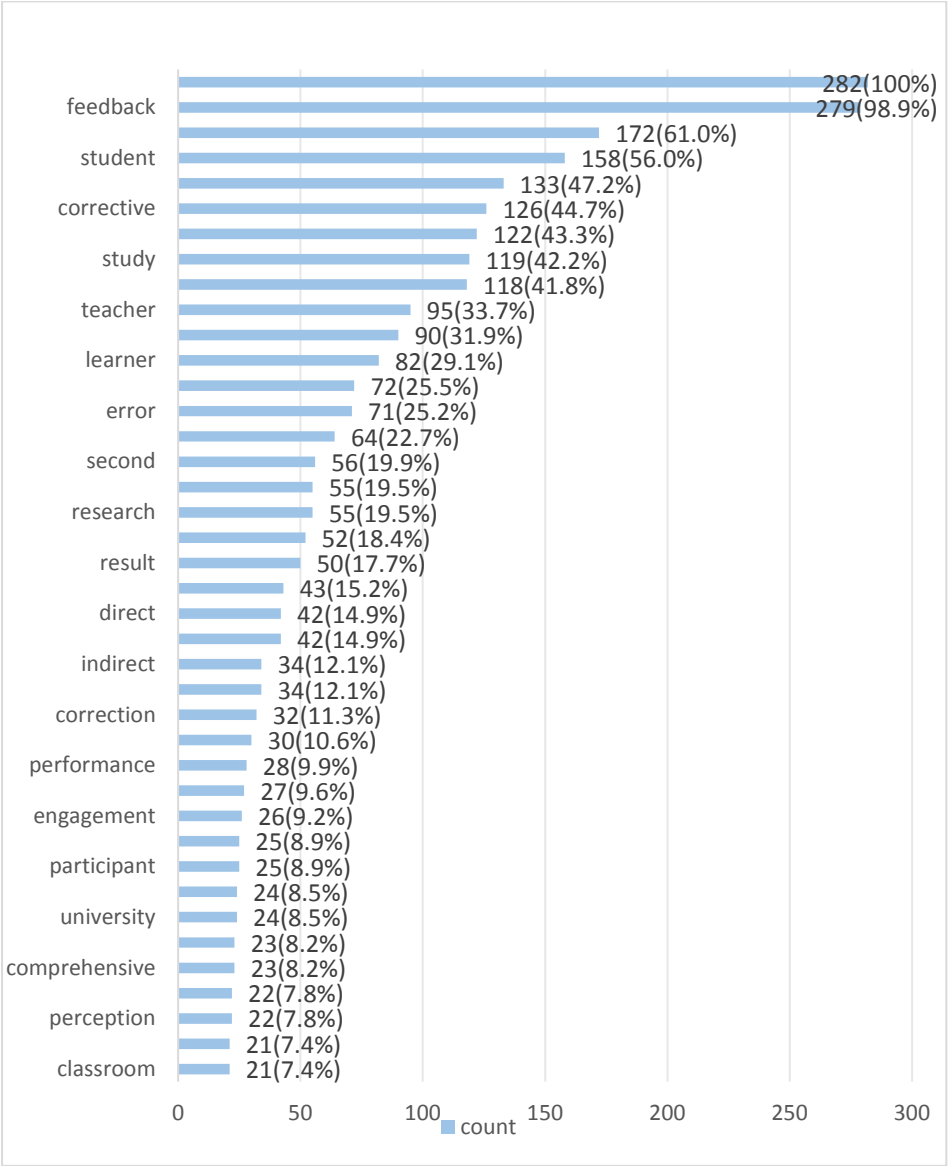


Table 3

Six Thematic Categories from the Word-Level Concepts

Prevalence	Theme	Concept
1	Types of Feedback	feedback, WCF, DWCF, corrective, correction, direct, indirect, dynamic
2	Research Design	experimental, group, treatment, study, research, result, approach, comprehensive
3	Writing Process	writing, written, classroom, instruction, revision
4	Participants and Educational Contexts	student, learner, teacher, participant, engagement, perception, university, EFL, second
5	Types of Errors	error, grammatical, linguistic, language, English
6	Writing Performance	accuracy, complexity, fluency, performance, effect

Results

RQ1: What Types of Feedback have been Examined in the Included WCF and DWCF Studies?

Analysis of the 54 included studies reveals different types of the reviewed WCF and DWCF studies (see Table 4). Among the WCF studies (n=38), direct and indirect feedback was examined in 11 studies (e.g. Benson & DeKeyser, 2019; Bitchener & Knoch, 2010; Karim, 2024), while 4 studies adopted metalinguistic feedback. Notably, metalinguistic feedback was frequently combined with direct correction, indicating a trend toward hybrid conditions (e.g. Karim & Nassaji, 2020). On the contrary, scope-oriented research were relatively rare. Only 1 study implemented focused WCF targeting a limited set of errors and unfocused/comprehensive WCF (e.g. Lee et al., 2021). This imbalance suggests that research mainly focus on explicitness rather than scope.

In terms of delivery mode, automated WCF (AWE or AI-based) accounted for 16% of the corpus (8 studies), reflecting a research orientation toward technology-mediated feedback (e.g. Barrot, 2023; Rahimi et al., 2024). Nevertheless, WCF provided by teacher continues to be the dominant way. Furthermore, 7 combined WCF studies typically blend direct and metalinguistic elements or automated with teacher feedback, which indicates an attempt to integrate the complementary advantages of different feedback sources.

Concerning DWCF studies (n=16), researchers explored not only feedback type but also dynamic parameters such as timing, frequency, setting. Five studies contrasted DWCF with process-oriented instruction, while four studies directly compared it with traditional WCF. Other studies concentrated on feedback timeliness (timely vs. postponed), frequency (every-other-day vs. daily), social configuration (group vs. individual), and online DWCF (e.g. Eckstein et al., 2020; Hartshorn et al., 2023). Notably, the latest study by Hartshorn and Pack (2026) compared AI-based DWCF and traditional teacher teacher-provided DWCF to investigate their influences on writing performance and user sentiment respectively.

Table 4

Types of WCF in the Reviewed Studies

Types of WCF	Definition	Included Studies (NO.)
Direct/indirect WCF	Direct WCF: teacher identifies errors and provides the correct form (Bitchener et al., 2005). Indirect WCF: teacher indicates that errors have been made but does not provide corrections (Bitchener et al., 2005).	2, 8, 13, 14, 15, 26, 30, 33, 52, 53, 54
Focused/Unfocused (Comprehensive) WCF	Focused WCF: teacher selects specific errors to be corrected and ignores other errors (Ellis et al., 2008). Unfocused WCF: teachers correct all or most of the errors in learners' writing (Ellis et al., 2008).	11
Metalinguistic WCF	Teacher not only indicates the presence of errors but also provides linguistic information or grammatical rules related to errors (Benson & DeKeyser, 2019).	23, 33, 52, 53
Automated WCF	Automated corrective feedback is generated by computer programs or AI systems, such as automated writing evaluation tools or grammar checkers, which provide instant corrections or suggestions (Shadiev & Feng, 2023).	1, 12, 16, 18, 20, 25, 29, 35
Dynamic WCF	Dynamic WCF is an interactive mechanism by multi-round feedback and revision, following the principles of meaningful, timely, constant and manageable (Hartshorn et al. , 2010).	36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 50, 51
Combined WCF	The use of two or more types of corrective feedback simultaneously (e.g., direct + metalinguistic, focused + indirect) to maximize their complementary strengths.	4, 5, 27, 31, 33, 48, 49

Study NO. correspond to the full reference list in Appendix A.

RQ2: What Research Designs have been Employed in the Included WCF and DWCF Studies?

Tables 5 and Table 6 show specific research design of WCF and DWCF in the reviewed studies respectively, including research method, instruments and contexts. With regard to research design in WCF studies (n = 38), quantitative method takes up more than half with 52.63%, most with quasi-experimental pre-test and post-test frameworks, sometimes extended with delayed post-tests and questionnaires (e.g. Karim & Nassaji, 2020; Kim & Emeliyanova, 2021). These designs enable researchers to measure effects on accuracy, complexity, and fluency. Mixed method design accounts for around two-fifths, combining writing tests with questionnaires, interviews, or classroom observations to explore writing performance as well as learner perceptions and engagement. By contrast, there is a small percentage with 5.26% in qualitative method

(e.g. Zheng et al., 2023). Interviews, oral reports and text analysis are employed to investigate instructional practices and learners' subjective experiences.

As for DWCF studies (n =16), quantitative research takes the leading role with three quarters, using pre-test and post-test to compare DWCF with traditional WCF or process writing approach (Hartshorn & Evans, 2015; Kurzer, 2018a). More specifically, timeliness, frequency, and learner configuration are used as variables in some experimental designs. Besides, 18.75% studies are mixed method research, which generally adopts tests, interviews or questionnaire surveys to examine the effects of DWCF and learner perceptions toward dynamic cycles. In the included studies, only one qualitative study is identified, focusing on online DWCF (Zoom, Canvas) and reporting learners' experiences through verbal reports.

In terms of research contexts,WCF research was carried out mainly in China and the United States, while DWCF studies were concentrated in the United States, China, and Iran. This pattern shows that existing studies are geographically limited and may not reflect the full range of instructional settings worldwide.

Table 5

Research Design of WCF in the Reviewed Studies

Research Design	Main Instruments	Contexts	Included Studies (NO.)
Quantitative Method	Pre-test and post-test (with/without delayed post-test); Questionnaires; Quantified think-aloud protocols	USA (n=5), China (n=5), Canada (n=2), Others (Indonesia, Pakistan, Ethiopia, Peru, Korea, Dutch)	2, 4, 5, 6, 13, 14, 15, 16, 18, 21, 23, 24, 26, 27, 30, 31, 32, 33, 34, 53
Qualitative Method	Text analysis, oral reports, and interviews	China (n=2)	7, 19
Mixed Method	Pre-test and post-test + questionnaires/interviews/ focus group discussions; Classroom observations; Writing tasks	China (n=7), Canada (n=1), Saudi Arabia (n=3), Thailand (n=2), Malaysia (n=1), Iran (n=1), Others (Vietnam)	1, 3, 8, 9, 10, 11, 12, 17, 20, 22, 25, 28, 29, 35, 52, 54

Study NO. correspond to the full reference list in Appendix A.

Table 6

Research Design of DWCF in the Reviewed Studies

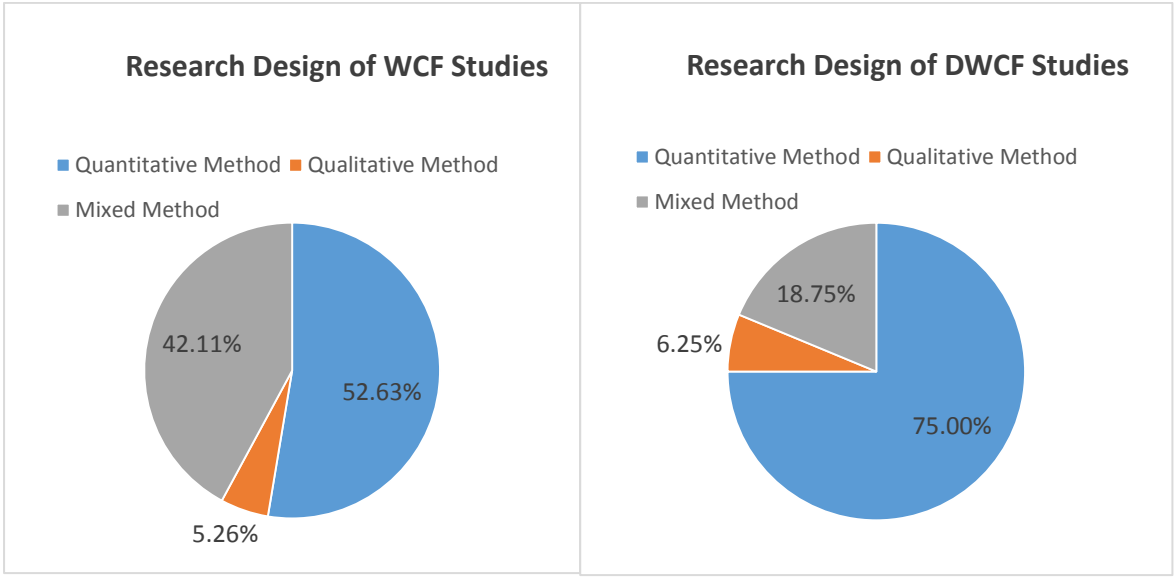
Research Design	Main Instruments	Contexts	Included Studies (NO.)
Quantitative method	Pre-test and post-test (with/without delayed post-test)	USA (n=8), China (n=1), Iran (n=3)	36, 37, 39, 40, 41, 42, 43, 44, 46, 47, 48, 49
Qualitative method	Zoom, Canvas, verbal reports	USA (n=1)	45
Mixed method	Pre-test and post-test + interviews; Questionnaire surveys + interviews	USA (n=2), Iran (n=1)	38, 50, 51

Study NO. correspond to the full reference list in Appendix A.

Figure 4 compares proportion of different research designs in the WCF and DWCF studies, with both WCF and DWCF studies dominant by quantitative method.

Figure 4

Comparison between Research Design of WCF and DWCF Studies



RQ3: What are the Effects of WCF and DWCF on Writing Performance and Psychological Factors in the included Studies?

Notably, there are 24 studies reporting significant gains in accuracy in the included WCF studies (e.g. Karim, 2024; Kim & Emeliyanova, 2021; Mahmood & Aziz, 2023; Zhang & Cheng, 2021). However, several studies showed only short-term improvement, indicating that accuracy gains are stronger in immediate revisions than in delayed post-tests or transfer tasks. For complexity, only 2 studies demonstrated positive effects of WCF, whereas 7 studies reported no significant changes (e.g. Cheng & Zhang, 2021; Linh Hoang, 2024), and 1 study found the negative effects. Effects on fluency were similar, with 3 studies showing gains and 2 studies reporting no significant effects. From the aspect of psychological factors, about one-third of WCF studies highlighted positive outcomes such as greater engagement and noticing, though a few studies indicated increased cognitive load or mixed reactions to automated feedback.

In terms of DWCF studies, 10 studies reported improvements in accuracy (e.g. Deghatkar et al., 2023; Hartshorn & Pack, 2026; Rassaei, 2021). Nonetheless, a small proportion of studies found inconsistent or even negative results. In the dimension of complexity and fluency, the number of studies with positive and no significant effects is 3 and 4 respectively, while only 1 study advocated the negative effects on complexity. Besides, a single study addressed psychological outcomes (e.g. Kurzer, 2018b), but these consistently suggested that learners perceived DWCF as motivating and supportive.

Table 7

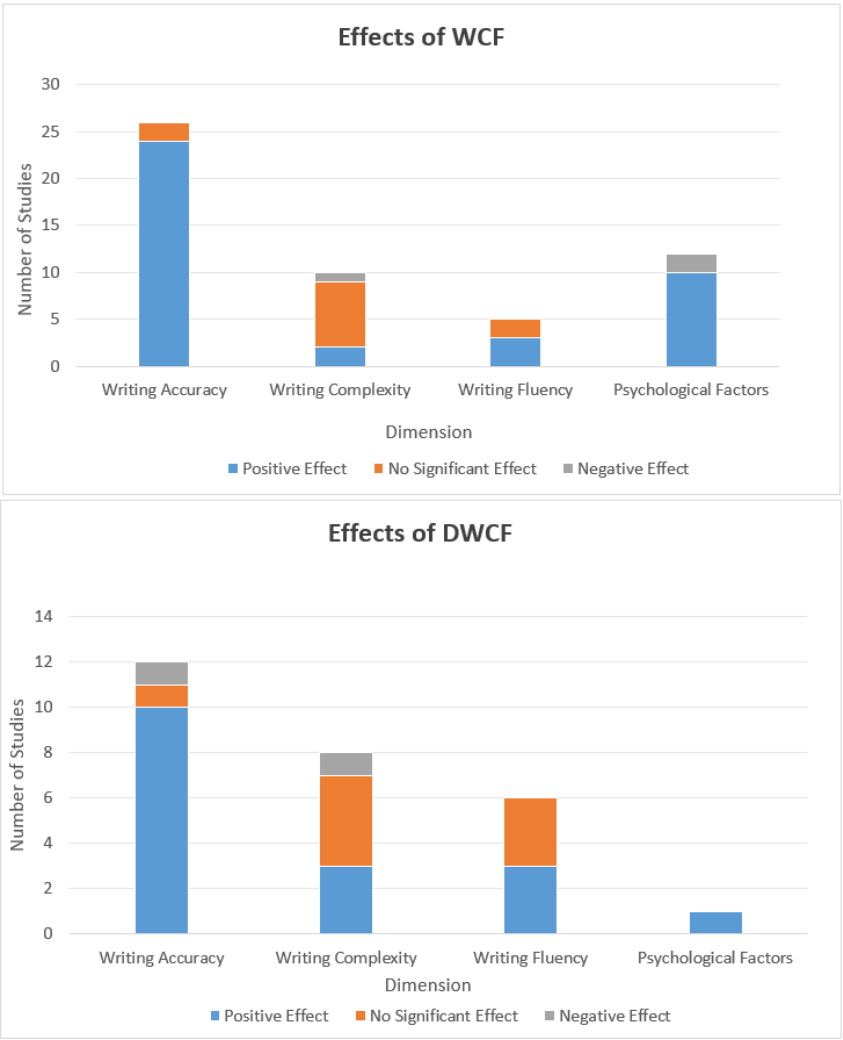
Effects of WCF and DWCF in the Reviewed Studies

Dimension	Intervention	Positive Effect	No Significant Effect	Negative Effect
Writing Accuracy	WCF	1, 2, 3, 4, 5, 6, 8, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 24, 27, 28, 31, 35, 53, 54	4, 25	/
	DWCF	36, 37, 38, 39, 40, 43, 46, 47, 48, 51	48	44
Writing Complexity	WCF	20, 22	3, 12, 14, 16, 21, 25, 27	17
	DWCF	38, 46, 47	36, 37, 40, 51	44
Writing Fluency	WCF	3, 22, 27	16, 25	/
	DWCF	38, 46, 47	36, 37, 40	/
Psychological Factors (e.g. engagement, attitudes)	WCF	7, 11, 12, 20, 21, 23, 25, 29, 31, 32	/	25, 31
	DWCF	50	/	/

Study NO. correspond to the full reference list in Appendix A.

Figure 5

Comparison between Effects of WCF and DWCF Studies



Discussion

Regarding RQ1, the included WCF and DWCF literature shows distinct feedback type preferences. Most WCF research focus on the explicitness of the correction through direct, indirect, metalinguistic, and combined feedback, whereas few studies pay attention to whether the feedback is focused or non-focused/comprehensive. This emphasis may limit the application of different WCF types in authentic writing contexts and influence language learners' writing development (Ferris, 2010). More importantly, an excessive focus on explicitness may make us overlook the fact that 'what to correct' and 'how much to correct' have an equally profound effect on learners' cognitive processing and emotional responses, while teachers in actual classroom settings need to make decisions across all these dimensions simultaneously. Consequently, neglecting the 'focused or non-focused' dimension may undermine the effectiveness of transformation research findings into teaching practice.

On the other hand, DWCF research concentrate on some dynamic process variables, namely feedback timing, frequency, or iteration counts. This tendency shifts the focus of analysis from static feedback to potential dynamic development. DWCF further integrates dynamic scaffolding and iterative assistance within the Zone of Proximal Development (ZPD) framework (Vygotsky & Cole, 1978). More specifically, it facilitates transitions from teacher assistance to independent learning, which not only enhances accuracy but also exerts effects on complexity, fluency, motivation, and long-term transfer. It is noteworthy that DWCF studies manipulate dynamics in many ways. Some studies manipulate feedback opportunities in a single writing cycle, some emphasize multiple rounds of feedback-revision cycles in the same writing, and some track the changes of learners' responses to feedback throughout the semester.

Furthermore, the increase of blended WCF and automated WCF literature demonstrates the positive effects of technology on feedback timeliness and generalizability. However, technology-driven feedback also raises a question about whether interaction between teachers and students will be weakened or not when the feedback is highly automated. It is exactly the important basis for dynamic feedback to play its role. Overall, the findings of RQ1 reveal two major tendencies. WCF research emphasize explicitness of correction and gradually expands to automated feedback, while DWCF research highlights the timeliness and iteration of feedback. Future research are expected to explore the scope and multidimensional effects, especially in the context of the combination of technology and dynamics.

In terms of RQ2, WCF research presents a more balanced distribution, and the proportion of mixed methods is close to that of quantitative methods, which reflects that scholars seek triangular verification between WCF effectiveness and learners' attitudes. Researchers are not only interested in whether feedback is effective, but also in understanding why it is effective and how learners experience the feedback process.

Triangular verification by mixed method can reveal the gap between the feedback given by teachers and the actual reception and understanding of learners, thus providing an explanation for the inconsistent feedback effect.

However, DWCF research relies more on experimental design in order to realize "dynamic" cycle of feedback and revision. In the included DWCF studies, quantitative methods dominate overwhelmingly, reflecting the traditional empirical paradigm in second language acquisition studies. They typically employed quasi-experiment by pre-test and post-test and even delayed post-tests. These designs give strong evidence about changes in accuracy, complexity and other measurable features when variables (e.g. feedback type or timing) are manipulated. DWCF is a relatively new emerging research field, and the dominant position of this paradigm is understandable. It requires a necessary basic work to establish the causal relationship between dynamic feedback and learning effectiveness. Notably, the lack of qualitative studies is the common feature of WCF and DWCF studies. Without more in-depth qualitative studies, it is difficult to understand learners' inner experiences, such as perceptions, engagement, emotions, or the reasons behind whether they actually take up the feedback. This gap also limits our understanding of how different research methods affect the findings about feedback, learner development and long-term uptake. Therefore, it is necessary to introduce qualitative or mixed methods in future research to supplement the current quantitative research paradigm dominated by experimental design.

As for RQ 3, both WCF and DWCF consistently show positive effects on accuracy, which align with skill acquisition theory by DeKeyser (2020). Explicit correction provides declarative knowledge, which gradually transforms into procedural knowledge and becomes automated through repeated error corrective feedback and revision. As the correction of grammatical and lexical errors follows clear rules, learners find it relatively easy to internalize knowledge through repeated cycles of feedback and revision'. It is one of the main reasons for accuracy gains no matter in WCF or DWCF studies. The consistency of the findings further proves that error correction feedback is an indispensable part of second language writing teaching.

Nevertheless, the effects of WCF or DWCF on complexity and fluency are inconsistent, and some studies even report negative effects. The reason for this is that putting much emphasis on error correction may induce extra mental load and pulls attention away from meaning or more advanced language structures. According to Skehan's (1998) trade-off hypothesis, learners' attention resources are limited, and giving priority to accuracy may sacrifice complexity and fluency. This trade-off is particularly prominent in the traditional WCF research. In many traditional WCF studies, learners make short and one-round revisions, not leaving enough time for consolidation or transfer to new writing tasks. DWCF with repeated cycles and longer-term support seem to offer more chance for steady improvement. It can be seen that the "trade-off" between complexity, fluency and

accuracy is more obvious in the single-round feedback mode, and the dynamic feedback may alleviate this tension to some extent by removing the scaffolds distributed in multiple interactions, but this inference needs more empirical tests. In short, both WCF and DWCF most reliably enhance accuracy, but their effects on complexity and fluency are more variable and sometimes contradictory. WCF studies examines whether the gains last and transfer to new writing, while DWCF research highlights adjustment of dynamic process variables to maximize the effects. Around one-third of WCF studies and only a few DWCF studies examined psychological factors, generally reporting positive effects but also pointing to gaps in systematic evaluation. At present, the understanding of the psychological effect of error correction feedback is still not sufficient. Writing is an activity deeply involved in learners' identity and emotions, feedback can not only enhance confidence and self-efficacy, but also pose a threat. Thus, it is suggested that future research should adopt a multidimensional framework that integrates linguistic performance with psychological and affective dimensions. It would give us a much fuller picture of what corrective feedback really achieves in the writing classroom.

Conclusion

This study selected 54 articles from WOS, Scopus and Google Scholar databases to make a systematic literature review of WCF and DWCF research published from 2010 to 2026. Through three research questions, the feedback types, research design and comprehensive influence on writing performance of WCF and DWCF are fully demonstrated. The results show that direct feedback is still the most common form, and automated feedback and DWCF have gained popularity in recent years. With regard to research design, the majority of studies adopt the pre-test and post-test framework of quasi-experiment, supplemented by the mixed method of questionnaire or interview and few qualitative research focusing on learners' perception. As for the effects, both WCF and DWCF can steadily improve the writing accuracy, but the results of complexity and fluency are not consistent. Moreover, the effects of WCF and DWCF on psychological factors are found to be generally positive.

This systematic literature review reveals a shift from product-oriented to process-oriented in writing feedback research. Writing development is gradually viewed as an iterative and personalized process, which bridges traditional WCF research with emerging dynamic frameworks and deepens our understanding of feedback' s role in long-term language development. The findings suggest that accuracy improvements are often achieved by explicit WCF, and DWCF makes more sense in process-oriented classrooms because it emphasizes repeated cycles and psychological engagement. The consistent positive effects on affective factors further underscore the value of integrating reflections, feedback literacy training, and self-efficacy support.

Despite these contributions, there are some limitations in the current review. It is confined to English-language publications from major international databases,

overlooking relevant studies in other languages or regional sources. Furthermore, by focusing on empirical intervention studies with measurable outcomes, it excludes descriptive, theoretical, and other non-empirical studies that could offer valuable complementary perspectives. Regarding methodology, this review only combines narrative synthesis and descriptive statistical methods to systematically sort out and describe the existing studies. Meta-analysis or other advanced statistical analysis can be used to further expand the depth by discussing the heterogeneity of evidence or the effect size in future research.

Future research should concentrate more on long-term studies to track whether the benefits of WCF or DWCF last and transfer to new writing tasks weeks or months later. Combined WCF or DWCF in digital environments would help identify practical integration strategies. Apart from learners' writing levels, there is still a lot to explore in individual differences and teacher factors. On the whole, corrective feedback plays a significant role in writing development, but its long-term effect, high-level writing achievement and psychological influence still need to be further explored.

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Malini Ganapathy: Supervision, Methodology, Validation, Writing-Review & Editing, Project Administration

Generative AI Use Disclosure Statement

No AI was used in this project.

Ethics Declarations

World Medical Association (WMA) Declaration of Helsinki–Ethical Principles for Medical Research Involving Human Participants

This study is a systematic review of published literature and did not involve human participants, primary data collection, or any form of medical research on humans.

Competing Interests

No, there are no conflicting interests.

Data Availability

No new data were generated or analyzed in support of this research. All data supporting the findings are from previously published sources, which have been appropriately cited in the manuscript.

References

Almohawes, M. (2025). Undergraduate EFL learners' preferences for three different types of written corrective feedback. *Frontiers in Education*, *10*, Article 1532729. https://doi.org/10.3389/feduc.2025.1532729

Alshahrani, A., & Storch, N. (2025). Investigating the effectiveness of scaffolded feedback on EFL Saudi students' writing accuracy: A longitudinal classroom-based study. *Assessing Writing*, *63*, Article 100910. https://doi.org/10.1016/j.asw.2024.100910

Alsofyani, A. H., & Barzanji, A. M. (2025). The effects of ChatGPT-generated feedback on Saudi EFL learners' writing skills and perception at the tertiary level: A mixed-methods study. *Journal of Educational Computing Research*, *63*(2), 431-463. https://doi.org/10.1177/07356331241307297

An, H., & Li, S. (2025). The interplay between planning conditions, direct focused feedback, and individual differences on EFL learners' second language development. *System*, Article 103728. https://doi.org/10.1016/j.system.2025.103728

Barrot, J. S. (2023). Using automated written corrective feedback in the writing classrooms: Effects on L2 writing accuracy. *Computer Assisted Language Learning*, *36*(4), 584-607. https://doi.org/10.1080/09588221.2021.1936071

Bearman, M., Smith, C. D., Carbone, A., Slade, S., Baik, C., Hughes-Warrington, M., & Neumann, D. L. (2012). Systematic review methodology in higher education. *Higher Education Research & Development*, *31*(5), 625-640. https://doi.org/10.1080/07294360.2012.702735

Benson, S., & DeKeyser, R. (2019). Effects of written corrective feedback and language aptitude on verb tense accuracy. *Language Teaching Research*, *23*(6), 702-726. https://doi.org/10.1177/1362168818770921

Bitchener, J. (2008). Evidence in support of written corrective feedback. *Journal of Second Language Writing*, *17*(2), 102-118. https://doi.org/10.1016/j.jslw.2007.11.004

Bitchener, J., & Knoch, U. (2010a). Raising the linguistic accuracy level of advanced L2 writers with written corrective feedback. *Journal of Second Language Writing*, *19*(4), 207-217. https://doi.org/10.1016/j.jslw.2010.10.002

Bitchener, J., & Knoch, U. (2010b). The contribution of written corrective feedback to language development: A ten-month investigation. *Applied Linguistics*, *31*(2), 193-214. https://doi.org/10.1093/applin/amp016

Bitchener, J., & Storch, N. (2016). *Written corrective feedback for L2 development* (Vol. 96). Multilingual Matters. https://doi.org/10.21832/9781783095056

Bitchener, J., Young, S., & Cameron, D. (2005). The effect of different types of corrective feedback on ESL student writing. *Journal of Second Language Writing*, *14*(3), 191-205. https://doi.org/10.1016/j.jslw.2005.08.001

Brown, D., Liu, Q., & Norouzian, R. (2023). Effectiveness of written corrective feedback in developing L2 accuracy: A Bayesian meta-analysis. *Language Teaching Research*, Article 13621688221147374. https://doi.org/10.1177/13621688221147374

Chen, M. R. A. (2024). Metacognitive mastery. *Educational Technology & Society*, *27*(3), 407-427. https://doi.org/10.30191/ETS.202407_27(3).TP05

Cheng, X., & Zhang, L. J. (2024). Examining second language (L2) learners' engagement with AWE-teacher integrated feedback in a technology-empowered context. *The Asia-Pacific Education Researcher*, *33*(4), 1023-1035. https://doi.org/10.1007/s40299-024-00877-8

Cheng, X., & Zhang, L. J. (2021). Sustaining university English as a foreign language learners' writing performance through provision of comprehensive written corrective feedback. *Sustainability*, *13*(15), Article 8192. https://doi.org/10.3390/su13158192

Chong, S. W. (2019). A systematic review of written corrective feedback research in ESL/EFL contexts. *Language Education & Assessment*, *2*(2), 57-69. https://doi.org/10.29140/lea.v2n2.138

Deghatkar, V. S., Khodareza, M. R., & Valipour, V. (2022). The impact of dynamic written corrective feedback on the accuracy of English passive voice usage in foreign language narrative writing. *Biannual Journal of Education Experiences*, *5*(1), 173-189.

Deghatkar, V. S., Khodareza, M. R., & Valipour, V. (2023). The impact of dynamic written corrective feedback on Iranian EFL learners' writing accuracy, fluency and complexity. *Journal of Studies in Learning and Teaching English*, *12*(1), 39-60.

DeKeyser, R. (2020). Skill acquisition theory. In B. VanPatten, G. D. Keating, & S. Wulff (Eds.), *Theories in second language acquisition* (3rd ed., pp. 83–104). Routledge. https://doi.org/10.4324/9780429503986-5

Diab, N. M. (2023). The impact of language learning strategies and motivation on L2 writers' lexical accuracy in response to WCF. *Feedback Research in Second Language*, *1*(1), 197–225. https://doi.org/10.32038/frsl.2023.01.11

Eckstein, G., & Bell, L. (2023). Dynamic written corrective feedback in first-year composition: Accuracy and lexical and syntactic complexity. *RELC Journal*, *54*(3), 630-647. https://doi.org/10.1177/00336882211061624

Eckstein, G., Sims, M., & Rohm, L. (2020). Dynamic written corrective feedback among graduate students: The effects of feedback timing. *TESL Canada Journal*, *37*(2), 78-102. https://doi.org/10.18806/tesl.v37i2.1339

Ellis, R., Sheen, Y., Murakami, M., & Takashima, H. (2008). The effects of focused and unfocused written corrective feedback in an English as a foreign language context. *System*, *36*(3), 353-371. https://doi.org/10.1016/j.system.2008.02.001

Evans, N. W., Hartshorn, K. J., & Strong-Krause, D. (2011). The efficacy of dynamic written corrective feedback for university-matriculated ESL learners. *System*, *39*(2), 229-239. https://doi.org/10.1016/j.system.2011.04.012

Fan, N. (2023). Exploring the effects of automated written corrective feedback on EFL students' writing quality: A mixed-methods study. *Sage Open*, *13*(2), Article 21582440231181296. https://doi.org/10.1177/21582440231181296

Ferris, D. R. (2010). Second language writing research and written corrective feedback in SLA: Intersections and practical applications. *Studies in Second Language Acquisition*, *32*(2), 181-201. https://doi.org/10.1017/S0272263109990490

Ganapathy, M., Tan, D. A. L., & Phan, J. (2020). Impact of written corrective feedback on Malaysian ESL secondary students' writing performance. *3L, Language, Linguistics, Literature*, *26*(3), 139-153. https://doi.org/10.17576/3L-2020-2603-11

Gebremariam, H. T. (2024). Exploring the effects of written corrective feedback types on grammatical accuracy in L2 writing: Evidence from Ethiopian high school students. *Sage Open*, *14*(3), Article 21582440241274331. https://doi.org/10.1177/21582440241274331

Gough, D. (2007). Weight of evidence: A framework for the appraisal of the quality and relevance of evidence. *Research Papers in Education*, *22*(2), 213-228. https://doi.org/10.1080/02671520701296189

Gough, D., Thomas, J., & Oliver, S. (2017). *An introduction to systematic reviews*. Sage. https://doi.org/10.53841/bpsptr.2017.23.2.95

Grant, M. J., & Booth, A. (2009). A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, *26*(2), 91-108. https://doi.org/10.1111/j.1471-1842.2009.00848.x

Hartshorn, K. J., Evans, N. W., Merrill, P. F., Sudweeks, R. R., Strong-Krause, D. I. A. N. E., & Anderson, N. J. (2010). Effects of dynamic corrective feedback on ESL writing accuracy. *TESOL Quarterly*, *44*(1), 84-109. https://doi.org/10.5054/tq.2010.213781

Hartshorn, K. J., & Evans, N. W. (2015). The effects of dynamic written corrective feedback: A 30-week study. *Journal of Response to Writing*, *1*(2), 6-34.

Hartshorn, K. J., & Pack, A. (2026). The effects of artificial intelligence-based dynamic written corrective feedback on second language writing and user sentiment. *RELC Journal*, Article 00336882251405498. https://doi.org/10.1177/00336882251405498

Hartshorn, K. J., Rice, S. H., Eckstein, G., & Evans, N. W. (2023). Dynamic written corrective feedback frequency and its effects on ESL writing fluency, accuracy, and complexity. *Foreign Language Studies*, *1*(2), 7-32. https://doi.org/10.32038/frsl.2023.01.02

Hassanzadeh, M., & Fotoohnejad, S. (2021). Implementing an automated feedback program for a Foreign Language writing course: A learner-centric study: Implementing an AWE tool in a L2 class. *Journal of Computer Assisted Learning*, *37*(5), 1494-1507. https://doi.org/10.1111/jcal.12587

Imsa-ard, P., & Barrot, J. S. (2024). Combining multimodal technology-mediated and peer feedback: Effects on second language (L2) learners' complexity, accuracy, and fluency (CAF) in writing. *Computer Assisted Language Learning*, 1-39. https://doi.org/10.1080/09588221.2024.2443770

Kamalian, A., & Lashkarian, A. (2014). The effect of dynamic written corrective feedback on Iranian elementary learners' writing. *International Journal of Applied Linguistics and English Literature*, *3*(5), 47-56. https://doi.org/10.7575/aiac.ijalel.v.3n.5p.47

Kao, C. W., & Reynolds, B. L. (2024). Timed second language writing performance: Effects of perceived teacher vs perceived automated feedback. *Humanities and Social Sciences Communications*, *11*(1), 1-14. https://doi.org/10.1057/s41599-024-03522-3

Karim, K. (2024). Effects of direct and indirect comprehensive corrective feedback on non-grammatical accuracy in ESL students' writing. *Language Testing in Focus*: *An International Journal*, *9*, 1–17. https://doi.org/10.32038/ltf.2024.09.01

Karim, K., & Nassaji, H. (2020). The revision and transfer effects of direct and indirect comprehensive corrective feedback on ESL students' writing. *Language Teaching Research*, *24*(4), 519-539. https://doi.org/10.1177/1362168818802469

Kendon, K. (2022). Accuracy gains from unfocused feedback: Dynamic written corrective feedback as meaningful pedagogy. *Journal of Language and Education*, *8*(4), 102-116. https://doi.org/10.17323/jle.2022.13380

Kim, M., & Hiver, P. (2025). The effect of metacognitive instruction with indirect written corrective feedback on secondary students' engagement and functional adequacy in L2 writing. *Assessing Writing*, *66*, Article 100962. https://doi.org/10.1016/j.asw.2025.100962

Kim, Y., & Emeliyanova, L. (2021). The effects of written corrective feedback on the accuracy of L2 writing: Comparing collaborative and individual revision behavior. *Language Teaching Research*, *25*(2), 234-255. https://doi.org/10.1177/1362168819831406

Kisnanto, Y. P. (2016). The effect of written corrective feedback on higher education students' writing accuracy. *Jurnal Pendidikan Bahasa dan Sastra UPI*, *16*(2), 121-131. https://doi.org/10.17509/bs_jpbsp.v16i2.4476

Kurzer, K. (2018a). Dynamic written corrective feedback in developmental multilingual writing classes. *TESOL Quarterly*, *52*(1), 5-33. https://doi.org/10.1002/tesq.366

Kurzer, K. (2018b). Student perceptions of dynamic written corrective feedback in developmental multilingual writing classes. *Journal of Response to Writing*, *4*(2), 34-68.

Kurzer, K. (2023). Dynamic written corrective feedback: A scoping review. *Feedback Research in Second Language*, *1*, 93-108. https://doi.org/10.32038/frsl.2023.01.06

Lee, I. (2020). Utility of focused/comprehensive written corrective feedback research for authentic L2 writing classrooms. *Journal of Second Language Writing*, *49*, Article 100734. https://doi.org/10.1016/j.jslw.2020.100734

Lee, I., Luo, N., & Mak, P. (2021). Teachers' attempts at focused written corrective feedback in situ. *Journal of Second Language Writing*, *54*, Article 100809. https://doi.org/10.1016/j.jslw.2021.100809

Lee, I., Luo, N., & Mak, P. (2023). Issues of error selection for focused written corrective feedback in authentic classroom contexts. *RELC Journal*, *54*(3), 616-629. https://doi.org/10.1177/00336882211028425

Lee, I., & Mohebbi, H. (2020). Written corrective feedback (WCF): Teachers' knowledge, beliefs and practice. *Language Teaching Research Quarterly*, *25*, 1-4. https://doi.org/10.32038/ltrq.2021.25.01

Leow, R. P. (2023). Written corrective feedback and the language curriculum: Theory, research, curricular issues, and the researcher-teacher interface. *Feedback Research in Second Language*, *1*(1), 109–128. https://doi.org/10.32038/frsl.2023.01.07

Linh Hoang, G. T. (2024). Effects of automated feedback on English as a foreign language learners' writing performance: Evidence from a quasi-experiment. *RELC Journal*, Article 00336882241268359. https://doi.org/10.1177/00336882241268359

Lira-Gonzales, M. L., Nassaji, H., De Tejeda, M. L., Vasquez, D., & Saenz, K. (2024). The differential effect of oral and written corrective feedback on learners' explicit versus implicit knowledge. *Language Teaching Research*, Article 13621688241248440. https://doi.org/10.1177/13621688241248440

Lira-Gonzales, M. L., Valeo, A., & Barkaoui, K. (2021). Teachers' Beliefs and Practice about Written Corrective Feedback: A Case Study in a French as a Foreign Language Program. *Language Teaching Research Quarterly*, *25*, 5-28. https://doi.org/10.32038/ltrq.2021.25.02

Liu, W. (2025). A bibliometric analysis of written corrective feedback in second language writing. *Language Teaching Research Quarterly*, *49*, 133-150. https://doi.org/10.32038/ltrq.2025.49.07

Liu, R., & Xu, Y. (2023). The research on the application of dynamic written corrective feedback in secondary vocational students' English writing. *Journal of Global Economy, Business and Finance*, *5*(7), 17-24. https://doi.org/10.53469/jgebf.2023.05(07).17

Mahmood, R. Q., & Aziz, M. A. (2023). Effects of explicit written corrective feedback on subject-verb agreement among Kurdish EFL students. *Language Teaching Research Quarterly*, *34*, 49-62. https://doi.org/10.32038/ltrq.2023.34.04

Mao, Z., & Lee, I. (2020). Feedback scope in written corrective feedback: Analysis of empirical research in L2 contexts. *Assessing Writing*, *45*, Article 100469. https://doi.org/10.1016/j.asw.2020.100469

Mohebbi, H. (2021). 25 years on, the written error correction debate continues: An interview with John Truscott. *Asian-Pacific Journal of Second and Foreign Language Education*, *6*(1), 3. https://doi.org/10.1186/s40862-021-00110-9

Mohsen, M. A. (2022). Computer-mediated corrective feedback to improve L2 writing skills: A meta-analysis. *Journal of Educational Computing Research*, *60*(5), 1253-1276. https://doi.org/10.1177/07356331211064066

Mujtaba, S. M., Reynolds, B. L., Parkash, R., & Singh, M. K. M. (2021). Individual and collaborative processing of written corrective feedback affects second language writing accuracy and revision. *Assessing Writing*, *50*, Article 100566. https://doi.org/10.1016/j.asw.2021.100566

Pae, C. U. (2015). Why systematic review rather than narrative review?. *Psychiatry Investigation*, *12*(3), 417. https://doi.org/10.4306/pi.2015.12.3.417

Petticrew, M., & Roberts, H. (2008). *Systematic reviews in the social sciences: A practical guide*. John Wiley & Sons. https://doi.org/10.1002/9780470754887

Rahimi, M., Fathi, J., & Zou, D. (2024). Exploring the impact of automated written corrective feedback on the academic writing skills of EFL learners: An activity theory perspective. *Education and Information Technologies*, 30(3), 2691-2735. https://doi.org/10.1007/s10639-024-12896-5

Rassaei, E. (2021). Effects of dynamic and non-dynamic corrective feedback on EFL writing accuracy during dyadic and small group interactions. *International Review of Applied Linguistics in Language Teaching*, *59*(2), 233-265. https://doi.org/10.1515/iral-2016-0044

Reinders, H., & Mohebbi, H. (2018). Written corrective feedback: The road ahead. *Language Teaching Research Quarterly*, *6*, 1-6. https://doi.org/10.32038/ltrq.2018.06.01

Reynolds, B. L., & Kao, C. W. (2021). The effects of digital game-based instruction, teacher instruction, and direct focused written corrective feedback on the grammatical accuracy of English articles. *Computer Assisted Language Learning*, *34*(4), 462-482. https://doi.org/10.1080/09588221.2019.1617747

Reynolds, B. L., Kao, C. W., & Huang, Y. Y. (2021). Investigating the effects of perceived feedback source on second language writing performance: A quasi-experimental study. *The Asia-Pacific Education Researcher*, *30*(6), 585-595. https://doi.org/10.1007/s40299-021-00597-3

Sang, Z., & Zou, W. (2023). The effect of joint production on the accuracy and complexity of second language writing. *Journal of Psycholinguistic Research*, *52*(2), 425-443. https://doi.org/10.1007/s10936-022-09882-8

Shadiev, R., & Feng, Y. (2023). Using automated corrective feedback tools in language learning: A review study. *Interactive Learning Environments*, *32*(6), 2538-2566. https://doi.org/10.1080/10494820.2022.2153145

Sheen, Y. (2010). Differential effects of oral and written corrective feedback in the ESL classroom. *Studies in Second Language Acquisition*, *32*(2), 203-234. https://doi.org/10.1017/S0272263109990507

Sinha, T. S., & Nassaji, H. (2022). ESL learners' perception and its relationship with the efficacy of written corrective feedback. *International Journal of Applied Linguistics*, *32*(1), 41-56. https://doi.org/10.1111/ijal.12378

Skehan, P. (1998). *A cognitive approach to language learning*. Oxford University Press.

Tabari, M. A., Sato, M., & Wang, Y. (2023). Engagement with written corrective feedback: Examination of feedback types and think-aloud protocol as pedagogical interventions. *Language Teaching Research*, Article 13621688231202574. https://doi.org/10.1177/13621688231202574

Torres, C., & Mihai, F. M. (2023). Implementing dynamic written corrective feedback in a distance learning environment: Lessons and challenges. Hachetetepé. *Revista científica de educación y comunicación*, (27), 1-23. https://doi.org/10.25267/Hachetetepe.2023.i27.2204

Truscott, J. (1996). The case against grammar correction in L2 writing classes. *Language Learning*, *46*(2), 327-369. https://doi.org/10.1111/j.1467-1770.1996.tb01238.x

Truscott, J. (2023). What about validity? Thoughts on the state of research on written corrective feedback. *Feedback Research in Second Language*, *1*, 33-53.

Van Beuningen, C. G., De Jong, N. H., & Kuiken, F. (2012). Evidence on the effectiveness of comprehensive error correction in second language writing. *Language Learning*, *62*(1), 1-41. https://doi.org/10.1111/j.1467-9922.2011.00674.x

Vygotsky, L. S., & Cole, M. (1978). *Mind in society: Development of higher psychological processes*. Harvard University Press. https://doi.org/10.2307/j.ctvjf9vz4

Wei, W., & Cao, Y. (2020). Written corrective feedback strategies employed by university English lecturers: A teacher cognition perspective. *SAGE Open*, *10*(3), Article 2158244020934886. https://doi.org/10.1177/2158244020934886

Wondim, B. M., Bishaw, K. S., & Zeleke, Y. T. (2024). Effectiveness of teachers' direct and indirect written corrective feedback provision strategies on enhancing students' writing achievement: Ethiopian university entrants in focus. *Heliyon*, *10*(2), Article e24279. https://doi.org/10.1016/j.heliyon.2024.e24279

Yang, L., Zhang, L., Li, C., Wang, K., Fan, L., & Yu, R. (2021). Investigating EFL teachers' beliefs and practices about written corrective feedback: A large-Scale study. *Language Teaching Research Quarterly*, *25*, 29-65. https://doi.org/10.32038/ltrq.2021.25.03

Zhang, L. J., & Cheng, X. (2021). Examining the effects of comprehensive written corrective feedback on L2 EAP students' linguistic performance: A mixed-methods study. *Journal of English for Academic Purposes*, *54*, Article 101043. https://doi.org/10.1016/j.jeap.2021.101043

Zheng, Y., Yu, S., & Liu, Z. (2023). Understanding individual differences in lower-proficiency students' engagement with teacher written corrective feedback. *Teaching in Higher Education*, *28*(2), 301-321. https://doi.org/10.1080/13562517.2020.1806225

Appendix A

Overview of the 54 Primary Studies on WCF and DWCF

No	Studies	Independent Variables	Dependent Variables	Participants	Country	Methods	Findings
1	Barrot (2023)	Automated WCF (AWCF) and non-AWCF	L2 writing accuracy	65 ESL students from a private university	Philippines	Mixed method (pre-test and post-test, open-ended questionnaire)	1. AWCF was beneficial to improving students' writing accuracy, promoting noticing, adaptive metalinguistic explanation, and self-directed learning. 2. There were some challenges for AWCF, including overcorrection, cognitive overload, and limited metalinguistic explanation.
2	Benson and DeKeyser (2019)	Direct feedback, metalinguistic feedback and traditional feedback	Verb tense accuracy	151 ESL college learners from 14 English for academic purposes (EAP) classes	USA	Quantitative method (Pre-test, post-test, delayed post-test)	1. Both experiment groups performed better than the control group, and direct feedback was more durable than metalinguistic feedback for the simple past tense. 2. Participants with greater language-analytic ability (LAA) benefited more from direct feedback, whereas learners with lower LAA benefited more from metalinguistic feedback.
3	Zhang and Cheng (2021)	Comprehensive WCF and no feedback	L2 EAP students' linguistic performance	72 EFL university students	China	Mixed method (pre-test, post-test, delayed post-test, open-ended questionnaire)	1. WCF was helpful to enhancing writing accuracy and fluency significantly, and the positive effects remained in the delayed post-test. 2. WCF did not improve syntactic complexity.

4	Karim and Nassaji (2020)	Direct WCF, indirect underline+metalinguistic WCF, indirect underline only WCF, and no WCF	L2 learners' revision accuracy and new pieces of writing	53 adult intermediate level ESL learners	Canada	Quantitative method (pre-test, post-test and delayed post-test)	1. All the three feedback groups performed significantly better than the control group in revision tasks. 2. There were some short-term accuracy improvements in new pieces of writing for direct and underlining+metalinguistic feedback, but the effects were not significant.
5	Reynolds and Kao (2021)	Digital game-based instruction, teacher instruction, and direct focused WCF	Grammatical accuracy of English articles	45 university EFL students	China	Quantitative method (pretest, immediate post-test, and delayed post-test)	1. For L2 writers, focused grammar teaching with direct focused feedback were more beneficial than just providing error correction. 2. Timely grammar feedback provided during the game promoted learners' memory of grammar knowledge.
6	Kim and Emeliyanova (2021)	Self-correction and pair-correction	L2 writing accuracy and learners' responses to WCF (i.e. revision behavior)	36 ESL learners of the Intensive English Program	USA	Quantitative method (pre-test and post-test)	1. The pair-correction group performed better in accuracy than the self-correction group. 2. There was a significant improvement in writing accuracy for both groups after receiving feedback. However, there was no difference in improvement between two groups.

7	Zheng et al. (2023)	WCF	Engagement with teacher WCF and the influencing factors	2 lower-proficiency (LP) undergraduate students (EFL)	China	Qualitative method (analyzing teacher WCF, students' essay drafts, immediate oral reports, and retrospective interviews)	1. Two students' engagement were obviously different. One's engagement was relatively extensive in emotion, while the other's was relatively limited with negative emotions and lack of cognitive engagement. 2. The influencing factors of different engagement were students' beliefs and goals, as well as the contextual factors of teacher-student relationship.
8	Sinha and Nassaji (2022)	Direct WCF, indirect WCF and no feedback	ESL learners' perception and its relationship with the efficacy of WCF	56 adult ESL students of Summer Academic Intensive Program (ELAI)	Canada	Mixed method (writing tasks, questionnaires)	1. The results showed that the two feedback groups' performance were significantly better than the control group in revision and new writing. 2. There was no significant relationship between learners' perception and the effectiveness of the two feedback types.
9	Wei and Cao (2020)	WCF strategies	University English lecturers' practices and beliefs of WCF strategies	254 EFL university teachers	Thailand, China, and Vietnam	Mixed method (questionnaire survey)	1. Teachers provided high demand, low demand and no demand feedback on students' proficiency. 2. Teachers' cognition of providing feedback and their reported use of feedback strategies were inconsistent.

10	Ganapathy et al. (2020)	WCF	Types of WCF by teachers, students' and teachers' perceptions towards WCF	482 students and 15 teachers in five secondary schools (ESL)	Malaysia	Mixed method (a questionnaire survey and focus group discussions)	1. Students and teachers regarded WCF as a useful method to improve students learning outcomes. 2. Students preferred teachers to mark all errors, and teachers were used to providing unfocused, indirect, and metalinguistic WCF.
11	Lee et al. (2021)	Focused WCF, traditional feedback	Written accuracy and revision	2 English teachers and 63 students of an English-medium secondary school (EFL)	China	Mixed method (interviews, classroom observations, pre-test and post-test)	1. The findings showed the feasibility of focused WCF in real classrooms, when it was consistent with writing teaching, and errors instruction according to students' personal needs. It helped teachers to strengthen writing teaching methods and feedback. 2. The findings showed the potential of focused student-specific WCF in improving writing accuracy and students' engagement in revision.
12	Rahimi et al. (2024)	Automated written corrective feedback (AWCF) and non-AWCF	Academic writing skills; behavioural, cognitive, and affective engagement; attitudes and perceptions towards AWCF	56 EFL learners	Iran	Mixed method (writing tasks, a stimulated recall technique, and an individual semi-structured interview)	1. One-way ANCOVA results indicated that e-learners are better than non-e-learners in writing performance, task achievement, grammatical scope and accuracy, but there was no significant difference in coherence, cohesion and vocabulary between the two groups. 2. Stimulated recall techniques identified the behavior, cognition and emotional engagement of electronic learners in AWCF.

13	Bitchener and Knoch (2010)	Direct WCF(written meta-linguistic explanation); indirect WCF (error circling); direct WCF (written meta and oral form-focused); non-WCF	Linguistic accuracy level	63 advanced L2 learners at a university (ESL)	USA	Quantitative method (pre-test, immediate post-test, delayed post-test)	1. There were significant differences in the immediate post-test writing accuracy between the control group and all three treatment groups. 2. There were significant differences in the delayed post-test writing accuracy between the control and indirect groups and the two direct treatment groups.
14	Van et al. (2012)	Direct CF, indirect CF and self-correction	L2 learners' written accuracy	134 ESL pupils in secondary schools	Dutch	Quantitative method (pre-test, language background questionnaire, post-test, delayed post-test)	1. Both direct and indirect comprehensive CF groups outperformed the control group in accuracy improvement of post-test and delayed post-test. 2. Only direct CF could improve grammatical accuracy in new writing, while indirect CF was helpful to students' non-grammatical errors. 3. When measuring the structural complexity and lexical diversity of students' new writing, CF didn't lead to simplified writing.
15	Kisnanto (2016)	Direct CF, indirect CF	Writing accuracy	43 university ESL students majoring IT	Indonesia	Quantitative method (pre-test, post-test)	1. Students who received direct CF improved writing accuracy significantly, while students who received indirect CF didn't gain significant improvement. 2. Compared to all types of errors, the untreatable error rate of the direct WCF group improved the most in writing accuracy.

16	Linh Hoang (2024)	Automated feedback, teacher feedback	Writing performance (accuracy, complexity, fluency)	75 EFL university students	China	Quantitative method (pre-test, post-test)	1. Automated feedback significantly improved writing accuracy compared to the control group, but effects on fluency and complexity were limited. 2. Teacher feedback remained slightly more effective overall.
17	Sang and Zou (2023)	Joint production	Writing Accuracy and Complexity	59 EFL university first-year students	China	Mixed method (pre-test, post-test, semi-structured interviews)	1. The experimental group performed significantly better than the control group in accuracy. 2. Accuracy improved steadily over time but showed a negative correlation with complexity.
18	Reynolds et al. (2021)	Automated feedback, teacher feedback	Writing performance	161 first-year undergraduate medicine majors	China	Quantitative method (4 writing tasks)	Automated feedback group outperformed the teacher feedback group on essay 2 and essay 3 but regressed from essay 3 to essay 4.
19	Lee et al. (2021)	Focused WCF	Errors selection	Two teachers in a secondary school with students with strong academic abilities	China	Qualitative method (interviews)	1. Error selection should align with genre and common learner weaknesses. 2. Moderate focus (2-5 error types) is manageable and effective. 3. Teachers should not be constrained by fixed error codes but adapt to teaching goals.

20	Cheng and Zhang (2024)	AWE-teacher integrated feedback, teacher feedback	Student engagement and writing performance	72 second year English major students from a medium-ranking university	China	Mixed-method (pre-test, post-test, questionnaires, semi-structured interviews)	1. The students receiving AWE-teacher integrated feedback engaged with feedback more profoundly in behavior and cognition than those in the control group while both groups showed similar affective engagement. 2. The treatment group improved their writing performance in content, organization, vocabulary, and language use more significantly than the control group.
21	Tabari et al. (2023)	WCF and think-aloud protocols	Revision quality in terms of syntactic complexity, accuracy, and lexical complexity	80 high-intermediate ESL university students	USA	Quantitative method (writing tests, quantified think-aloud protocols)	1. WCF and TAPs facilitated processing different feedback types. 2. WCF was helpful to learners' interlanguage systems restructuring. TAPs promoted learners' higher-order thinking, and it was useful to make strategic decisions in revising the text.
22	Imsa-ard and Barrot (2024)	Multimodal technology mediated feedback, traditional teacher feedback	Writing performance (complexity, accuracy, and fluency)	52 L2 writing college students	Thailand	Mixed method (pre-test, post-test, interviews)	1. The experimental group showed gains in complexity, accuracy, and fluency indices, whereas the control group improved significantly in complexity but declined in fluency. 2. Interviews confirmed the intervention's positive impact on CAF.
23	Chen, (2024)	Metalinguistic guidance-based Generative Artificial Intelligence Chatbots approach	Learning achievement, reflection, and metacognition skills	42 sophomore EFL English majors	China	Quantitative method (pre-test, post-test, pre-questionnaire, post-questionnaire)	The MG-based GAC group outperformed the CF-based group in learning achievement, reflection, and metacognitive awareness.

24	Mujtaba et al. (2021)	Individual or collaborative processing of WCF	Second language writing accuracy and revision	44 undergraduate students from four Academic and Professional Writing courses	Pakistan	Quantitative method (pre-test, post-test)	The collaborative processing group performed better than the individual group in error resolution and overall accuracy, producing fewer verb and word choice errors after three WCF cycles.
25	Fan (2023)	Automated WCF, teacher feedback	Writing quality	67 EFL non-English majors with lower level of English proficiency	China	Mixed method (pre-test, post-test, questionnaire with fixed-response and open-ended questions)	1. There was no significant CAF differences between the experimental group and control group. 2. The follow-up questionnaires revealed students' perceptions of Grammarly feedback.
26	Gebremariam (2024)	Types of WCF (direct, indirect, no feedback)	Grammatical accuracy in writing	150 grade 10 high school students	Ethiopia	Quantitative method (pre-test, immediate post-test and delayed post-test)	CF types improved immediate post-test scores but showed no lasting effect on L2 learners' grammatical accuracy in delayed tests.
27	Cheng and Zhang (2021)	Direct comprehensive WCF	Writing performance(complexity, accuracy, and fluency), writing quality (content and organization)	72 English major sophomores at a medium-ranked university	China	Quantitative method (pre-test, post-test and delayed post-test)	1. Direct comprehensive WCF improved accuracy and fluency, especially grammatical accuracy by reducing rule-based errors, but it had limited effects on complexity, content, and organization. 2. The control group showed no gains in all writing dimensions.

28	Alshahrani and Storch (2025)	Scaffolded WCF, non-scaffolded WCF	Writing accuracy and students' perceptions	71male English majors with intermediate proficiency level	Saudi Arabia	Mixed method (pre-test, immediate post-test, delayed post-test, questionnaires, semi-structured interviews)	1. Both groups improved in overall writing accuracy with no significant difference, but scaffolded feedback yielded greater gains in subject-verb and singular-plural agreement. 2. Students preferred scaffolding for explicit feedback than implicit feedback.
29	Kao and Reynolds (2024)	Automated feedback, teacher feedback	Writing performance and feedback trust	121 high-intermediate second language writers	China	Mixed method (pre-test, post-test, questionnaires, semi-structured interviews)	1. The perceived AWE feedback group's writing performance was superior to that of the teacher feedback group. 2. The perceived AWE feedback group showed greater trust in grammar and lexical feedback, suggesting high-intermediate learners may rely more on AWE for grammar and vocabulary.
30	Wondim et al. (2024)	Direct WCF, indirect WCF, no feedback	Writing achievement	135 freshman students	Ethiopia	Quantitative method (pre-test, post-test)	1. Both direct and indirect WCF significantly improved university entrants' writing performance compared to the control group. 2. Direct WCF with metalinguistic explanation was found to be most effective in enhancing their writing skills.

31	An and Li (2025)	Planning conditions, direct focused feedback, and individual differences	Writing accuracy in English articles and past tense forms	58 high school EFL learners	South Korea	Quantitative method (pre-test, post-test and delayed post-test)	1. Pre-task planning enhanced feedback effects on past tense but not on articles. 2. Executive working memory predicted article accuracy and showed stronger effects on past tense in within-task planning. 3. Phonological short-term memory was positively linked across conditions, while writing anxiety was beneficial in pre-task planning but negative in within-task planning.
32	Kim and Hiver (2025)	Metacognitive instruction with indirect WCF	Students' engagement and functional adequacy	54 intermediate-level secondary school students	Korea	Quantitative method (pre-test, immediate post-test, delayed post-test, questionnaire)	1. Students in the treatment group showed increased behavioral engagement. 2. Functional adequacy scores improved overall, but there was no differences between two groups. 3. Engagement with WCF did not predict functional adequacy significantly.
33	Lira-Gonzales et al. (2024)	Oral recast, Oral metalinguistic, direct WCF, direct metalinguistic WCF	Explicit and implicit knowledge	101 intermediate adult ESL students	Peru	Quantitative method (pre-test, post-test)	1. Both oral and written CF were better than no feedback, and WCF promoted on error correction more significantly. 2. Oral and written metalinguistic feedback outperformed than oral recast and direct WCF, and written metalinguistic was also effective in free writing.

34	Hassanzadeh and Fotoohnejad (2021)	Computer-generated feedback, teacher-generated feedback	Writing quality	53 tertiary level students	USA	Quantitative method (pre-test, post-test)	1. The computer-generated feedback group's writing scores improved significantly from pre-test to post-test. 2. Computer-generated feedback was proved to be more efficient than teacher-generated feedback.
35	Alsofyani and Barzanji (2025)	ChatGPT generated feedback, teacher-generated feedback	Writing skills and perceptions	102 female students at the tertiary level	Saudi Arabia	Mixed method (pre-test, post-test, questionnaire survey with open-ended questions)	1. The results showed no significant differences in posttest scores between two groups, proving the effectiveness of ChatGPT-generated feedback and teacher-generated feedback. 2. Students held overall positive attitudes toward the use of ChatGPT for academic writing.
36	Hartshorn et al. (2010)	Dynamic WCF and conventional process approach	Rhetoric competence, writing complexity, fluency, and accuracy	47 advanced-low to advanced-mid ESL students of Brigham Young University' s English Language Center	USA	Quantitative method (pre-test and post-test)	The results showed that there were no significant effects of DWCF on rhetoric ability, writing fluency and writing complexity, but the writing accuracy has been significantly improved.

37	Evans et al. (2011)	Dynamic WCF and conventional process approach	Writing complexity, fluency, and accuracy	45 university-matriculated ESL learners	USA	Quantitative method (pre-test and post-test)	The language accuracy of students who accepted traditional process writing teaching has declined, while the language accuracy of students who accepted dynamic WCF teaching has improved significantly.
38	Deghatkar et al. (2023)	Dynamic WCF and conventional process approach	Writing complexity, fluency, and accuracy	54 EFL learners at intermediate levels	Iran	Mixed method (pre-test and post-test, interview)	1. T-test proved that DWCF had a greater influence on the accuracy, fluency and complexity of students' writing. 2. Face-to-face interviews with EFL teachers showed that different types of WCF were helpful for learners to develop various writing skills.
39	Kurzer (2018a)	Dynamic WCF and conventional process approach	Self-editing ability, writing accuracy and effects on all error types	325 ESL students at three different levels	USA	Quantitative method (pre-test and post-test)	1. Compared with those students who only received traditional grammar teaching, multilingual students who received DWCF performed better at self-editing and writing accuracy. 2. There were significant differences in all error types, which verified the positive effects of DWCF on linguistic accuracy.
40	Hartshorn and Evans (2015)	Dynamic WCF and conventional process approach	Linguistic accuracy, rhetorical appropriateness, fluency, complexity, and vocabulary development	27 ESL learners in the intensive English program	USA	Quantitative method (pre-test and post-test)	There were more improvements in linguistic accuracy of the treatment group than the control group, but there were no differences in other fields.

41	Eckstein et al. (2020)	Timely or postponed DWCF	Grammatical errors, lexical and syntactic complexity, and fluency	22 ESL graduate students	USA	Quantitative method (pre-test and post-test)	1. The results revealed that neither timely nor delayed feedback significantly improved grammatical accuracy and lexical complexity, but timely feedback facilitated more fluent and complex writing. 2. Feedback time may be insignificant for the development of writing accuracy, but it was more important for the writing complexity of graduate students.
42	Hartshorn et al. (2023)	Every-other-day DWCF, daily DWCF and traditional teaching approach	Writing complexity, fluency, and accuracy	101 ESL university students	USA	Quantitative method (pre-test and post-test)	1. The every-other-day group and the daily group outperformed in writing accuracy than the control group, while the daily group showed significant larger gains in fluency compared to the other two groups. 2. There were no significant differences for clauses per T-unit. For mean length of T-unit, there was no significant difference between the control group and the daily group, but there was a significant decline for the every-other-day group compared to the control group.

43	Rassaei (2021)	Dynamic and non-dynamic (explicit correction) WCF; a single learner or a group of learners	Writing accuracy	96 EFL learners at intermediate levels	Iran	Quantitative method (pretest, immediate post-test, and delayed post-test)	1. Dynamic feedback improved the writing accuracy more effectively than explicit correction. 2. In the process of dyadic interactions, the dynamic feedback provided to a group of learners was more effective than that provided to a single learner.
44	Eckstein and Bell (2023)	Dynamic and non-dynamic WCF	Grammatical accuracy, lexical and syntactic complexity	63 ESL university students	USA	Quantitative method (pre-test and post-test)	1. Students who adopted DWCF didn't gain better performance than the control group. Instead, they had more verb errors, and the grammatical complexity is significantly lower. 2. DWCF may be not applicable to first-year discourse-based goals, such as genre and audience awareness.
45	Torres and Mihai (2023)	DWCF in a distance learning environment	Lessons and challenges of DWCF in a distance learning environment	4 international students of English for Academic Purposes (EAP) class (ESL)	USA	Qualitative method (Zoom, Canvas, verbal reports)	1. Participants held positive attitudes towards DWCF activities in the online setting. 2. Implementing DWCF online needed instructors' creative use of different kinds of technology tools.

46	Liu and Xu (2023)	DWCF and traditional WCF	Writing complexity, fluency, and accuracy	70 second year students of a vocational-technical school (EFL)	China	Quantitative method (pre-test and post-test)	It was found that DWCF improved writing accuracy, complexity and fluency, in which writing accuracy has been enhanced most significantly.
47	Sayad et al. (2022)	DWCF and traditional WCF	Writing complexity, fluency, and accuracy of English passive voice in narrative writing	54 students at intermediate level in Iranian Academic center of Education, Culture, and Research (ACECR) (EFL)	Iran	Quantitative method (pre-test and post-test)	DWCF was beneficial to improving students' performance on writing accuracy and grammar instruction, fluency and complexity.
48	Kendon (2022)	Unfocused DWCF and traditional grammar instruction	Writing accuracy	130 international students at intermediate and advanced levels (ESL)	USA	Quantitative method (pre-test and post-test)	1. Almost all error types (including but not limited to verb form/tense, sentence structure, word order, word selection, determiners, noun forms, punctuation errors) have been significantly improved after the experiment. 2. There was only no significant difference in the error type, namely intermediate preposition.
49	Kamalian and Lashkarian (2014)	DWCF and direct WCF	Writing abilities	46 EFL elementary students	Iran	Quantitative method (pre-test and post-test)	1. Both groups improved writing abilities after the experiment. 2. It was found that group A receiving dynamic WCF performed better than group b receiving direct WCF.

50	Kurzer (2018b)	DWCF vs traditional grammar WCF	Students' perceptions of their writing abilities and writing courses	145 ESL university students for surveys and 3 students for interviews (at three levels—beginning, intermediate, and advanced)	USA	Mixed method (surveys and semi-structured interviews)	1. Participants usually appreciated and attached importance to DWCF, especially as a supplement to grammar textbooks. 2. Students using DWCF scored higher on most survey items, such as grammar feedback and classroom teaching.
51	Hartshorn and Pack (2026)	AI-based DWCF vs traditional teacher teacher-provided DWCF	writing accuracy, fluency, complexity, and functional adequacy;user sentiment for teacher and students	41 ESL intermediate-high learners	USA	Mixed method (pre-test and post-test; commentary)	1. Both groups improved in writing accuracy, but the teacher feedback group outperformed the AI group in fluency and functional adequacy, with no significant differences in syntactic complexity. 2. Although Claude 3.5 Sonnet raised reliability issues due to unexpected autocorrections, Claude potentially outperformed Opus and ChatGPT-4 in error detection.
52	Almohawes (2025)	Types of written corrective feedback (direct, indirect, metalinguistic)	Learners' preferences for the types of written corrective feedback; reasons behind these preferences	320 undergraduate students for questionnaire and 16 students for semi-structured interviews	Saudi Arabia	Mixed method (questionnaire and semi-structured interviews)	1. Students showed a preference for metalinguistic and direct written corrective feedback, both of which supported improvements in writing proficiency and language knowledge. 2. Indirect corrective feedback was considered time-consuming and insufficiently informative, negatively impacting learning.

53	Karim (2024)	Direct WCF, two indirect WCF (underlining only and underlining+ metalinguistic cues)	Non-grammatical accuracy	53 intermediate level adult ESL students	Canada	Quantitative method (4 writing tests)	1. There were significant gains in non-grammatical accuracy in revision tasks in both direct and underline only feedback groups. 2. There were none significant short-term and delayed non-grammatical accuracy gains in new writings in all feedback groups displayed.
54	Mahmood and Aziz (2023)	Explicit WCF	writing accuracy (subject-verb agreement); students' perceptions and	60 EFL undergraduate students	Iraq	Mixed method (pre-test and post-test; questionnaire)	Students preferred explicit WCF, and it was more helpful to improve writing accuracy in terms of subject-verb agreement.