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Research Paper

**Teacher Feedback, Automated Feedback, and
Critical Thinking: Their Influence on Students'
Writing Performance**

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Abstract

Developing EFL writing performance remains challenge in English education. This study examined the relationship among teacher feedback, automated written corrective feedback (AWCF), and students' critical thinking in predicting university students' writing performance in Indonesia. A quantitative research design was employed using Structural Equation Modeling (SEM), with data collected from 239 undergraduate students across twelve Indonesian university. Five latent constructs were measured through a validated questionnaire. The results indicate that teacher feedback demonstrated a significant positive effect on students' writing performance and on the development of critical thinking skills. However, AWCF did not show a significant direct effect on students' writing performance, and students' critical thinking did not significantly predict their writing outcomes. Futhermore, the mediating role of critical thinking between feedback and writing performance was not supported. These findings suggest that teacher-

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provided feedback remains a central mechanism influencing EFL writing achievement in higher education contexts, whereas automated feedback may function as a supplementary tool rather than a primary driver of improvement. This research contributes empirical evidence to ongoing discussion on feedback practices in L2 writing and highlights the importance of strengthening teacher feedback practices to support university students' writing development in EFL contexts.

Keywords: Feedback, Critical Thinking, Writing Performance, Language Learning.

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1. Introduction

Writing skills are central to language learning, serving as a cornerstone for developing overall language proficiency. Writing is not only a mechanism for practicing and consolidating vocabulary, grammar, and sentence structures but also a complex cognitive process that integrates critical thinking, organization, and self-expression (Chien et al., 2022; Jiang & Papi, 2021; Li, 2022; Wei & Cao, 2020; Fan & Ma, 2024; Zhang et al., 2021; Chin & Yap, 2024; Song & Xu, 2024). In second language (L2) learning, writing enables learners to actively apply linguistic knowledge, facilitating both accuracy and fluency. Beyond language development, strong writing skills are indispensable for academic and professional success, underpinning the production of essays, reports, and research papers, while equipping learners with competencies essential for effective communication in their future careers (Qasmi et al., 2022; Kondo et al., 2023; Cheng, 2024; Vandeweerd et al., 2023).

Feedback plays a pivotal role in writing development by providing learners with information on their strengths and weaknesses, which is essential for skill enhancement and fostering critical thinking. Teacher

feedback, in particular, has been shown to promote self-reflection and guide learners toward higher proficiency levels by offering targeted, error-specific guidance (Alharbi, 2023; Rasool et al., 2024; Zhan et al., 2021; Yu, 2024). At the same time, automated corrective feedback (ACF) tools, such as Grammarly, provide immediate feedback on lower-order concerns, allowing educators to focus on higher-order writing skills (Koltovskaia, 2022; Wahyudi et al., 2024). Research suggests that combining teacher feedback and ACF creates a synergistic feedback ecosystem that enables iterative skill refinement, supporting both accuracy and critical thinking development (Wei & Cao, 2020).

Despite the recognized benefits of feedback, challenges remain. Students often experience writing anxiety due to the complexity of organizing ideas and adhering to grammatical norms (Zhang et al., 2021; Li et al., 2020). Limited practice opportunities, coupled with cultural differences in writing conventions, can further hinder their development (Cheng, 2024; Sung, 2021). Without timely and effective feedback, learners may struggle to internalize improvements and build confidence in academic writing (Pertiwi & Ashadi, 2024; Hanafi et al., 2023).

Current research indicates a gap in understanding how teacher feedback and ACF interact within L2 writing development. While teacher feedback has traditionally dominated the literature, the growing use of digital tools calls for an exploration of how ACF can complement traditional feedback to enhance personalized learning (Teng, 2024; Wale & Bishaw, 2020). Integrating both feedback types offers the potential not only to improve writing proficiency but also to scaffold critical thinking skills, fostering a more holistic approach to writing instruction (Shahzad et al., 2024). Nonetheless, learners continue to confront challenges such as writing anxiety, varying language proficiency levels, and cross-cultural writing differences, which can limit their ability to

fully leverage feedback and develop higher-order thinking skills in writing (Wahyuni & Umam, 2022; Nejad et al., 2022; Hasanah et al., 2023).

Addressing these challenges while leveraging combined feedback strategies is essential for fostering comprehensive language development among learners in diverse educational contexts. This study aims to determine three research questions as follows:

1. Does the teacher feedback have impact on students' writing performance mediated by students' critical thinking?
2. Does the AWCF have impact on students' writing performance mediated by students' critical thinking?
3. Does the CTFA have impact on students' writing performance mediated by students' critical thinking?

2. Literature Review

2.1 Feedback

The theory of feedback in writing centers on the impactful role that feedback plays in enhancing students' writing skills, particularly in second language (L2) contexts. Feedback can be categorized into various forms, including teacher feedback, peer feedback, and automated feedback, each contributing uniquely to the writing process.

Firstly, teacher feedback, especially written corrective feedback (WCF), is recognized as a crucial element in the writing development of L2 learners. Studies indicate that WCF helps students notice their errors, understand complex writing conventions, and make guided revisions, which cumulatively improve their writing performance (Ganapathy et al., 2020; Soodmand Afshar et al., 2025). Regular feedback assists in identifying linguistic errors and provides students with opportunities for revision, directly influencing their writing accuracy (Ganapathy et al., 2020). In addition, Supiani et al. (2025) said that the effectiveness of teacher feedback

depends not only on its presence but also on how it is delivered and it can be associated with distinct learner emotions, influencing motivation, anxiety, and perceived usefulness.

Furthermore, according to Putra et al. (2022) teachers' feedback significantly impacts learners' academic performance and attitudes towards learning, promoting a more reflective approach to writing. This aligns with the assertion that feedback should stimulate self-reflection, which is vital for students' growth. Feedback models that emphasize learner involvement will encourage students to take ownership of their work by facilitating self-assessment and leading discussions on their learning pathways (Burgess et al., 2020). Such practices not only improve writing skills but also cultivate critical thinking as students learn to analyze their arguments, assess the validity of their content, and adapt based on constructive criticism.

Secondly, automated writing evaluation (AWE) tools, such as Grammarly or Turnitin, represent another avenue for feedback in writing. These tools provide immediate, structured feedback, helping develop student autonomy in writing. Current research indicates that automated systems can identify issues related to grammar, vocabulary, and writing style, subsequently guiding students in their revisions and contributing to improved writing quality (Alharbi, 2023; Wei et al., 2023). Research has found that AWE systems encourage iterative writing practices by delivering consistent suggestions for improvement (Wei et al., 2023). Furthermore, Linuwih et al. (2024) stated that students utilizing automated tools like Grammarly may experience enhanced awareness of their writing strengths and weaknesses, thereby encouraging critical analysis of their arguments and organizational strategies.

Lastly, despite the distinct advantages of each type of feedback, integrating these mechanisms often leads to enhanced writing outcomes for

students. Studies have indicated that a combination of teacher feedback, and the use of AWE creates a comprehensive support system during the revision process. This multi-faceted approach empowers students to take ownership of their learning and writing development (Wei et al., 2023). By integrating both automated and teacher feedback, students benefit from a dual-layered support system; the AWE tools streamline error correction and support self-directed learning through quick feedback loops, while teacher feedback nurtures deeper critical engagement and reflection (Nazari et al., 2021). Such an approach not only increases the quality of students' writing outcomes but also enhances their ability to critically assess their work and the writing of others, ultimately cultivating a more active, thoughtful writer capable of evaluating and improving their writing over time (Wei & Zhang, 2024).

2.2 Critical Thinking

Critical thinking Critical thinking (CT) is commonly positioned as a core educational outcome that centers on higher-order skills—particularly analysis, evaluation, and problem-solving—rather than the passive reproduction of information (Halim et al., 2023; Cesaria et al., 2025). Language-education scholarship emphasizes the need not only to promote awareness and practice of critical thinking but also to evaluate and assess it within language learning (Abduh et al., 2023). In practice, critical thinking is operationalized through tasks that require learners to scrutinize, deploy, and assess information rather than rely on rote memorization; content analysis of EFL textbooks in Indonesia describes critical-thinking activities embedded across language skills including writing suggesting that writing is one of the primary sites where critical thinking can be enacted through task design (Hasnah et al., 2023)

Empirical evidence shows that learners' CT abilities are significantly and positively associated with writing performance and can function as a

mechanism linking how students learn and how well they write, including mediating relations between learning strategies and writing outcomes (Nejad et al., 2022; Teng & Yue, 2022). Beyond simple correlation, CT has been modeled as a conditional factor shaping how effectively students transform knowledge into written texts: when learners actively deploy CT such as gathering diverse materials, weighing multiple viewpoints, and pursuing objective, problem-solving reasoning their writing proficiency improves, and CT can moderate the impact of content-knowledge representation strategies on writing outcomes (Xiaolei et al., 2023). This relationship is particularly evident in argumentation-intensive genres, where CT aligns with the capacity to generate and evaluate reasons and evidence. Accordingly, interventions integrating CT into writing instruction (such as task-based or technology-supported approaches for argumentative writing) report gains consistent with the premise that writing quality depends on students' abilities to analyze claims, justify positions, and evaluate alternatives (Tusino et al., 2020; Widyaningrum, 2020).

Pedagogically, academic writing pedagogies that embed CT across drafting, review, and assessment stages similarly emphasize feedback (from teachers, peers, and through self-reflection) as a driver of students' noticing, evaluation, and revision decisions (Susilo et al., 2021). Teacher feedback and online feedback processes further connect CT to writing performance because students learn not only from received comments but also from the evaluative act of giving feedback an activity that prompts reflective judgment, text-based evaluation, and revision planning thereby improving writing performance through both direct revision and observational learning mechanisms (Wu & Schunn, 2020; Shulgina et al., 2024).

Moreover, writing tasks themselves can elicit higher-order cognition, requiring learners to analyze source material and re-express it through

evaluation and synthesis, which supports deeper learning and provides a plausible cognitive basis for observed associations between CT and higher writing achievement (Kim et al., 2021). Writing-to-learn approaches explicitly foreground argument, evidence use, and evaluative reasoning as core mechanisms through which writing activities cultivate CT processes that are consequential for text quality (Kayaalp et al., 2020).

2.3 Feedback, Critical Thinking and their Combined effect on Students' Writing Performance

A recent EFL study suggests that feedback can improve EFL writing performance when it increases clarity, timeliness, and opportunities for revision, including via technology-mediated channels. For instance, automated writing evaluation (AWE) research in EFL contexts reports a consensus that AWE can enhance writing proficiency by supplying immediate and personalized feedback while reducing teacher workload, increasing the frequency and usability of feedback during drafting and revision cycles (Aldosemani et al., 2023). Similarly, Indriyani et al. (2023) said that integrates feedback into authentic writing production has been argued to inform learners about their writing performance and support their development as more proficient authors, indicating that feedback can influence both product quality and writerly dispositions.

Furthermore, related to the critical thinking, emperical evidence from online learning contexts shows that metacognitive strategies predict critical thinking skills relevant to planning and evaluating written texts, supporting a pathway where regulation processes foster cristical thinking skills (Shen et al., 2024). In line with this, critical thinking abilities can mediate the relationship between language learning strategies and EFL writing performance, implying that strategies contribute to writing achievement more

effectively when learners can evaluate, justify, and refine linguistic and rhetorical choices critically (Nejad et al., 2022).

Thus, the relationship between students' critical thinking and feedback that it can help the students to achieve their writing performance in which feedback provides external evaluative input and revision direction (Jwa, 2024), while critical thinking provides the internal capacity that enables learners to interpret feedback, weigh alternatives, and execute higher-quality revisions that translate into stronger EFL writing performance (Slim & Al-Omari, 2023). Pedagogical approaches that integrate feedback with metacognitive strategy instruction may be particularly relevant to critical thinking development. For instance, reciprocal pedagogy in an EFL classroom showed that applying metacognitive strategies through reciprocal teaching produced a significant difference in students' writing proficiency compared with a non-reciprocal-teaching group (Alehegn, Yigzaw, & Shifere, 2024). At the feedback level, Supiani et al. (2025) suggest that combining feedback forms (written and verbal) and types (direct and indirect) across stages of the writing process can support students' autonomy and deeper engagement with revision, which are closely related to higher-order thinking. These strands imply that 'combined feedback' may enhance writing performance not only through error correction but also by promoting reflective revision practices.

3. Method

3.1 Research Design

This study employed a quantitative-cross-sectional survey design to examine the structural relationships among Teachers' Feedback (TF), Automated Written Corrective Feedback (AWCF), the combination of both feedback types, students' Critical Thinking (SCT) abilities, and Students' Writing Performance (SWP). This study utilizes Structural Equation Modeling (SEM)

that enables researchers to analyze relationships among multiple variables simultaneously. It is particularly useful for examining latent constructs and their directional effects within a specified context, making it especially relevant for studies involving mediators such as Teachers' Feedback (TF) and Automated Written Corrective Feedback (AWCF) in relation to students' Critical Thinking (SCT) abilities and Writing Performance (SWP). The design was chosen because it allows examination of latent construct and directional effects using complex multivariate relationship within a single time frame.

3.2 Research Participant

A total of 239 undergraduate English-major students voluntarily participated in this study. All participants were enrolled at 12 universities located across Indonesia representing diverse geographical regions. Participants had prior experience receiving teacher feedback, automated corrective feedback, and the integration of both feedback methods in English writing courses. Participants were recruited using non-probability convenience sampling. Identifiable information was anonymized prior to analysis.

Table 1.

Demographic Information of Participant

		N	%
Gender	Male	38	15.90
	Female	201	84.10
Age	18-19	27	11.30
	20-21	166	69.45
	22-24	46	19.25
Institution name	Universitas Nahdatul Ulama Sunan Giri Bojonegoro	23	9.66
	UIN Fatmawati Sukarno Bengkulu	9	3.78
	Universitas Bengkulu	28	11.76

		N	%
	IAIN Palopo	19	7.98
	Universitas Hasyim Asy'ari, Jember	19	7.98
	Universitas Islam Makassar	7	2.94
	Universitas Muhammadiyah Kendari	10	4.20
	Universitas Sulawesi Barat	110	46.22
	Universitas Sulawesi Selatan	2	0.84
	Universitas Wijaya Kusuma Surabaya	2	0.84
	Universitas Papua	1	0.42
	Others	8	3.36
Region	Sulawesi	148	62.18
	Jawa	44	18.48
	Papua	1	0.42
	Sumatera	37	15.54
	Others	8	3.36
Academic Degree	Undergraduate	239	100

3.3 Data Collection and Instrument

The instrument consisted of 31 likert-scale items adapted from Tan et al. (2022). The scale measured five latent variables: teacher feedback (11 items), automated feedback (11 items), critical thinking feedback approach (8 items), critical thinking (5 items), and writing performance (10 items). Responses were recorded using 5-point agreement scale (1 = strongly disagree to 5 = strongly agree). Item wording was reviewed by two experts in applied linguistics for clarity and construct alignment. Data were collected online through a Google Form distributed by lecturers and research partners at participating institutions. Before accessing the questionnaire, participants viewed an information sheet describing the study purpose, data usage,

voluntary participation, confidentiality, and withdrawal rights. Data were gathered during one academic semester with no incentives provided.

3.4 Data Analysis

Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS version 4.0.9.8. PLS-SEM was selected due to its suitability for analysing complex models with multiple latent constructs, non-normal Likert data, and an exploratory predictive purpose (Hair et al., 2021). The analysis procedure consisted of two major stages. First, the **measurement model** was evaluated to determine the reliability and validity of the latent constructs. This included assessing factor loadings, Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), discriminant validity through the heterotrait–monotrait ratio (HTMT), and variance inflation factor (VIF) for multicollinearity detection (Hair et al., 2019). Every construct examined in this study exhibits AVE values surpassing the 0.50 threshold, signifying that each construct has the capability to elucidate a minimum of 50% of the variance inherent in each item within the model. In addition, the factor loadings for all measurement items were found to surpass the threshold of 0.60, indicating both convergent and discriminant dimensions (McDonald, 1996). Second, the **structural model** was analysed to evaluate the hypothesised relationships among constructs. Bootstrapping with 5000 subsamples at a 5% significance level was performed to examine the significance and strength of direct and indirect effects (Fornell & Larcker, 1981). Structural results included reporting of path coefficients, effect size (f^2), coefficient of determination (R^2), predictive relevance (Q^2), and model fit (SRMR). This analytical approach allowed the study to determine the extent to which feedback variables predicted students' writing performance and to investigate whether critical thinking acted as a mediating mechanism within the structural model.

4. Result and Discussion

4.1 Measurement Model

In the evaluation of measurement reliability, key indicators such as Cronbach's Alpha and composite reliability were included. With a predefined threshold of 0.70, these metrics provide valuable insights into the internal consistency of the constructs under examination. Encouragingly, all outcomes in the study surpassed the 0.70 benchmark for both Cronbach's Alpha and composite reliability, affirming the robustness of the variables considered. This positive outcome enhances the credibility of the measurements within the parameters of the assumed model (Hair et al., 2019). Next, the alternative approach employed in the analysis demonstrated that the heterotrait-monotrait (HTMT) for all constructs in the model consistently fell below the established threshold of 0.90 (Hair et al., 2017). Consequently, this study substantiates the presence of discriminant validity between the constructs. Additionally, the result from the analysis affirms that the composite reliability for all constructs exceeded 0.70, thereby confirming the internal consistency within each construct (McDonald, 1996; Hair et al., 2014). Table 1 and Table 2 presents the analysis of reliability convergent validity and discriminant validity.

Table 2.

The Result of Measurement Model

Variables	Items	Factor Loadings	Cronbach's α	Composite Reliability	Average Variance Extracted (AVE)
TF	TF1	0.710	0.925	0.927	0.574
	TF2	0.725			
	TF3	0.783			
	TF4	0.772			
	TF5	0.760			
	TF6	0.652			

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Variables	Items	Factor Loadings	Cronbach's α	Composite Reliability	Average Variance Extracted (AVE)
	TF7	0.798	0.942	0.945	0.632
	TF8	0.766			
	TF9	0.773			
	TF10	0.800			
	TF11	0.780			
AWCF	AWCF1	0.694	0.942	0.945	0.632
	AWCF2	0.795			
	AWCF3	0.787			
	AWCF4	0.789			
	AWCF5	0.805			
	AWCF6	0.777			
	AWCF7	0.822			
	AWCF8	0.836			
	AWCF9	0.797			
	AWCF10	0.804			
	AWCF11	0.826			
CTFA	CTFA1	0.814	0.939	0.940	0.700
	CTFA2	0.816			
	CTFA3	0.841			
	CTFA4	0.872			
	CTFA5	0.837			
	CTFA6	0.839			
	CTFA7	0.867			
	CTFA8	0.808			
SCT	SCT1	0.854	0.904	0.904	0.723
	SCT2	0.861			
	SCT3	0.832			
	SCT4	0.868			

Variables	Items	Factor Loadings	Cronbach's α	Composite Reliability	Average Variance Extracted (AVE)
	SCT5	0.837			
	SWP1	0.697	0.921	0.922	0.585
	SWP2	0.787			
	SWP3	0.785			
SWP	SWP4	0.762			
	SWP5	0.662			
	SWP6	0.804			
	SWP7	0.774			
	SWP8	0.782			
	SWP9	0.807			
	SWP10	0.774			

Table 3.

Discriminant Validity

Construct	AWCF	CTFA	SCT	SWP	TF
AWCF	1				
CTFA	0.817	1			
SCT	0.804	0.890	1		
SWP	0.810	0.857	0.889	1	
TF	0.805	0.854	0.890	0.898	1

4.2 Hypotheses Testing

To rigorously examine the structural model, a robust bootstrapping analysis was conducted utilizing 5000 subsamples at a significance level of 5% employing Smart-PLS 4.0. The research model accounted for 82% of the variance of SCT ($R^2 = 0.82$), and 99% of the variance of SWP ($R^2 = 0.99$). To assess the predictive efficacy of the model, an examination of the Q2 values was undertaken, and the value should be greater than zero, as

recommended by Hair et al. (2017). The findings revealed Q2 values of 0.82 and 0.99 for SCT and SWP respectively. These values serve as indicators of the model's ability to predict and capture the variations in each respective construct, with higher Q2 values signifying greater predictive relevance. Additionally, the findings revealed a SRMR value of 0.07, which is below the suggested threshold of 0.08, indicating a solid and satisfactory model fit (Hair et al., 2017).

In addition, the results of analysis indicated that AWCF did not influence SCT ($\beta = 0.046$, $p > 0.05$). However, this study found that CTFA significantly and positively influenced SCT ($\beta = 0.652$, $p < 0.001$). In addition, CTFA did not influence SWP ($\beta = 0.012$, $p > 0.05$), SCT did not influence SWP ($\beta = -0.012$, $p > 0.05$), and AWCF did not influence SWP ($\beta = 0.009$, $p > 0.05$). Interestingly, this study found that TF significantly and positively influenced SCT, ($\beta = 0.260$, $p < 0.001$), and SWP ($\beta = 0.996$, $p < 0.001$). Furthermore, the specific indirect effect showed that the three independent variables, namely, TF, AWCF, and CTFA, were not mediated by SCT in influencing the independent variable of SWP, as they did not meet the significance criteria with a p value < 0.05 . The pathways demonstrate statistical insignificance based on the associated T statistics and p -values of 0.706, 0.246, and 0.286, respectively. The detailed information of hypotheses testing is presented in Figure 1, Table 4 and Table 5.

Table 4.

Hypotheses Test Results

Hypotheses Path	Standardized path coefficient	T statistics	P values	Results
AWCF→SCT	0.046	0.657	0.511	Not supported
CTFA→SCT	0.652***	8.788	0.000	Supported
CTFA→SWP	0.012	0.700	0.484	Not supported

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Hypotheses Path	Standardized path coefficient	T statistics	P values	Results
SCT→SWP	-0.012	1.223	0.222	Not supported
AWCF→SWP	0.009	0.998	0.318	Not supported
TF→SCT	0.260***	4.428	0.000	Supported
TF→SWP	0.996***	494.737	0.000	Supported

*** $p < 0.001$, * $p < 0.05$

Table 5.

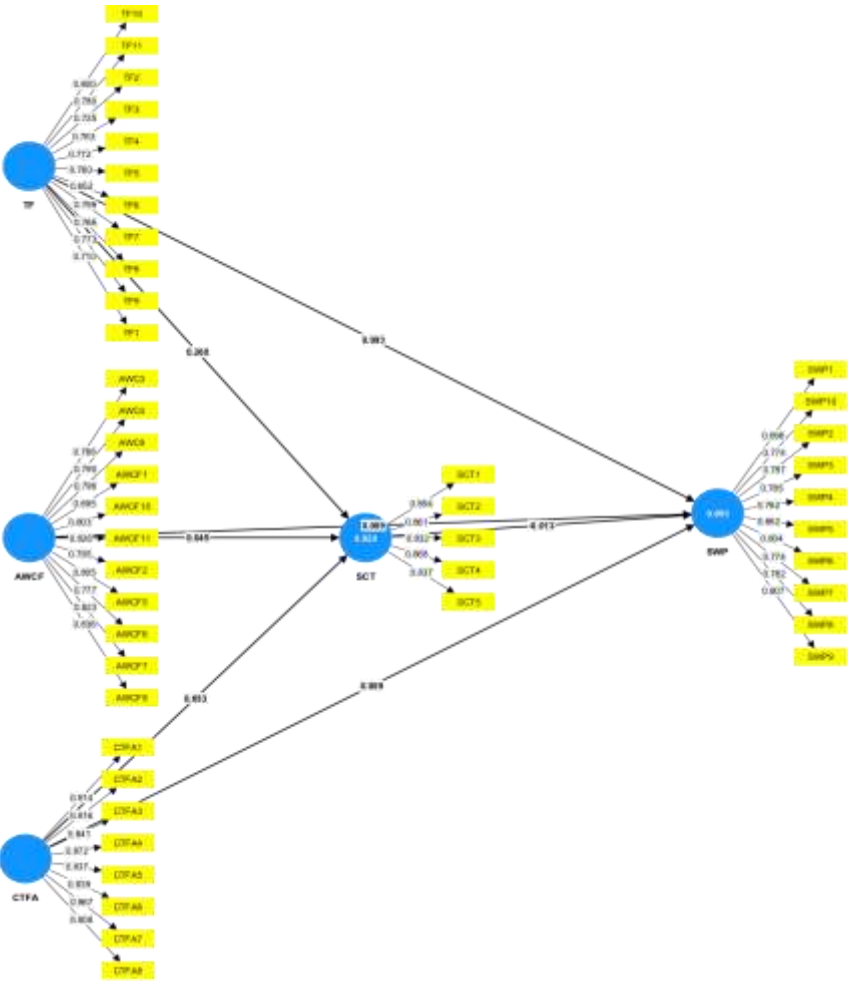
Specific Indirect Effect

Path	Standardized path coefficient	T statistics	P values	Results
AWCF→SCT→SWP	-0.001	0.377	0.706	Not supported
CTFA→SCT→SWP	-0.008	1.161	0.246	Not supported
TF→SCT→SWP	-0.003	1.066	0.286	Not supported

*** $p < 0.001$, * $p < 0.05$

Figure 1

Result of Measurement Model



4.3 Description And Discussion

The research findings presented in the study provide valuable insights into the effects of different types of feedback on students' critical thinking and

writing skills. The study examined the impact of automated written corrective feedback (AWCF) and teacher feedback on students' critical thinking and writing skills, as well as the mediating role of critical thinking in the relationship between feedback and writing skills.

The first finding indicates that AWCF has no significant effect on students' critical thinking skills. The statistical analysis revealed a non-significant beta coefficient ($\beta = 0.046$) with a p-value greater than 0.05, suggesting that providing automated feedback on student writing does not directly influence their critical thinking abilities. This finding challenges the assumption that AWCF alone can effectively enhance students' critical thinking skills. In line with this, while AWCF can provide immediate and detailed feedback on mechanical errors, it often lacks the depth required to foster critical thinking and deeper cognitive engagement with the writing process (Yang & Kyun, 2022).

This limitation is particularly evident in environments where students lean heavily on automated tools, leading to superficial error correction without prompting learners to engage in self-reflection or analysis of their arguments (Xu, 2021). For instance, a meta-analysis revealed that while AWCF shows a small-to-moderate effect on writing development, it primarily focuses on mechanical aspects rather than encouraging higher-order thinking skills (Li, 2022).

Secondly, the study found that teacher feedback has a positive and significant effect on students' critical thinking skills. The beta coefficient ($\beta = 0.260$) with a p-value less than 0.001 indicates that personally provided teacher feedback can contribute to the improvement of students' critical thinking abilities. This highlights the importance of personalized and direct feedback from teachers in fostering students' critical thinking skills. When teachers provide constructive, specific feedback on student writing, they not

only highlight areas for improvement but also challenge students to analyze their reasoning, question assumptions, and explore alternative viewpoints (Zhang & Hyland, 2022). This dialogic nature of feedback encourages students to think critically about their arguments and the effectiveness of their communication, ultimately leading to enhanced cognitive engagement with the material. Moreover, research has shown that feedback which emphasizes critical thinking prompts can significantly boost students' self-efficacy and motivation, further reinforcing their critical analysis skills (Xu et al., 2024). In turn, students who feel supported through effective feedback are more likely to appreciate the value of critical thinking in their learning journey, adopting a more reflective approach to their academic tasks (Hinduja et al., 2024). Thus, incorporating structured and purposeful teacher feedback into writing curricula is essential for developing not only writing proficiency but also critical thinking capabilities in students, equipping them with the skills necessary to navigate complex ideas and engage in thoughtful discourse.

The third, the research revealed that teacher feedback also has a positive effect on students' writing skills. The statistically significant beta coefficient ($\beta = 0.996$) with a p-value less than 0.001 demonstrates the substantial influence of teacher feedback on enhancing students' writing competence. This finding underscores the crucial role of teacher feedback in improving students' writing skills. Studies demonstrate that constructive feedback from teachers serves as an essential pedagogical tool, helping students identify their strengths and weaknesses in writing Xu (2021). This feedback addresses technical aspects such as grammar and syntax while also encouraging critical reflection on content, organization, and argumentation (Xu, 2021). Furthermore, teacher feedback promotes an interactive learning environment where students feel comfortable expressing their ideas and taking risks in

their writing (Burgess et al., 2021). They emphasize that nurturing atmosphere is crucial as it enables learners to develop their writing skills while also enhancing their confidence and autonomy as writers.

The fourth, the study investigated the mediating role of students' critical thinking in the relationship between the different feedback types and writing skills. However, the results indicated that students' critical thinking does not mediate the effects of the three feedback types (teacher feedback, AWCf, and critical thinking from authority) on students' writing skills. The statistical insignificance of the indirect effects for all three pathways ($p > 0.05$) suggests that students' critical thinking does not act as a mediator in the relationship between feedback and writing skills.

The assertion that students' critical thinking does not mediate the effects of various feedback types on their writing performance can be substantiated by several studies that highlight the complexities of these relationships. While feedback is generally acknowledged to enhance writing skills, its impact on critical thinking is more nuanced and may not always be direct. For instance, Shen et al. (2024) found that while metacognitive strategies heightened writing performance, critical thinking did not serve as a mediating factor between feedback types and writing outcomes. This suggests that although feedback can promote writing skills, it does not necessarily engage students in critical reflection, which is crucial for developing higher-order thinking. Additionally, Cortázar et al. (2021) indicated that the relationship between feedback and critical thinking may be influenced by factors such as students' existing knowledge and understanding of the feedback process, often resulting in inconsistencies in how they apply feedback to improve their writing. Furthermore, Yao et al. (2024) observed that the nature of automated feedback frequently focuses on surface-level corrections, limiting students' opportunities to engage in deeper analytical thinking about their writing.

Therefore, while the provision of feedback—whether from teachers, or automated systems—is vital for improving writing skills, it may not effectively stimulate critical thinking unless it is designed to challenge students intellectually and promote reflective practices (Shen et al., 2024).

5. Conclusion

This study underscores the significant role of both teacher and automated feedback in fostering students' writing proficiency and critical thinking skills within language learning contexts. Findings reveal that teacher feedback, characterized by its personalized and specific nature, positively influences students' critical thinking and writing performance by encouraging reflection, analysis, and a deeper engagement with their work. Conversely, automated written corrective feedback (AWCF) alone shows limited impact on critical thinking, primarily aiding in the correction of surface errors. However, when integrated with teacher feedback, these methods create a comprehensive feedback ecosystem that not only streamlines error correction but also promotes higher-order thinking, self-assessment, and autonomous learning among students.

The implications of this research highlight the importance of adopting a hybrid feedback approach to optimize language instruction. Educators should focus on combining the immediacy and efficiency of automated tools with the nuanced, reflective guidance of teacher feedback to cultivate both technical competence and critical thinking capabilities. Such an integrated strategy can address diverse learner needs, reduce writing anxiety, and prepare students for real-world academic and professional writing challenges. Future studies should further explore the dynamic interplay between these feedback mechanisms and develop tailored interventions that maximize their respective benefits in various educational settings.

Limitation of the Study

One of the primary limitations of this study is its reliance on self-reported data collected through questionnaires, which may be subject to response bias or social desirability effects. Participants might have provided answers they believed were expected or favorable, potentially influencing the accuracy of the findings related to their perceptions and experiences with different feedback types. Additionally, the use of Likert scale items, while effective for quantifying attitudes, may not capture the full depth and complexity of students' critical thinking processes and writing development.

Another limitation concerns the scope of the sample. Although the study involved participants from multiple universities across Indonesia, the sample size and geographical distribution may still limit the generalizability of the results to other contexts or populations. Cultural, linguistic, and educational differences might affect how feedback is received and utilized, which suggests that caution should be taken when applying these findings to different settings. Future research could benefit from longitudinal studies or larger, more diverse samples to better understand the long-term effects of combined feedback approaches on students' writing and critical thinking skills.

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Disclosure Statement

No potential conflict of interest was reported by authors.

Additional Information

The data of this study can be obtained from the corresponding author upon a reasonable request. There are no Applicable Restrictions on Data Availability.

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References

- Abduh, A., Mulyanah, A., Darmawati, B., Zabadi, F., Sidik, U., Handoko, W., Jayadi, K., & Rosmaladewi, R. (2023). The compleat lextutor application tool for academic and technological lexical learning: review and bibliometric approach. *Indonesian Journal of Science and Technology*, 8(3), 539–560. <https://doi.org/10.17509/ijost.v8i3.63539>
- Aldosemani, T. I., Assalahi, H., Lhothali, A., & Albsisi, M. (2023). Automated writing evaluation in EFL contexts. *International Journal of Computer-Assisted Language Learning and Teaching*, 13(1), 1–19. <https://doi.org/10.4018/ijcallt.329962>
- Alehegn, A., Filatie, A., Yigzaw, and Bishaw, K., Shifere. (2024). The reciprocal pedagogy: effects on students' writing proficiency development in an EFL classroom. *Teaching English Language*, 18(1), 317-339. doi: 10.22132/tel.2024.453473.1596
- Alharbi, W. (2023). AI in the foreign language classroom: A pedagogical overview of automated writing assistance tools. *Education Research International*, 2023, 1–15. <https://doi.org/10.1155/2023/4253331>
- Burgess, A., Roberts, C., Lane, A. S., Haq, I., Clark, T., Kalman, E., Pappalardo, N., & Bleasel, J. (2021). Peer review in team-based learning: Influencing feedback literacy. *BMC Medical Education*, 21(1). <https://doi.org/10.1186/s12909-021-02821-6>
- Cesaria, A., Adnan, M., Kemal, A., Rismen, S., Ramadoni, R. & Delyana, H., (2025). Exploring concepts of ethno-mathematics to introduce the local culture and its values for higher education students. *Al-Jabar: Pendidikan Matematika*, 16(1), 315-335
- Cheng, Z. (2024a). The influence of mother tongue thinking on second language writing. *Lecture Notes in Education Psychology and Public*

- Media, 59(1), None. <https://doi.org/10.54254/2753-7048/59/20241728>
- Cheng, Z. (2024b). The influence of mother tongue thinking on second language writing. *Lecture Notes in Education Psychology and Public Media*, 59(1), None. <https://doi.org/10.54254/2753-7048/59/20241728>
- Chien, Y., Wu, T., Lai, C., & Huang, Y. (2022). Investigation of the influence of artificial intelligence markup language-based LINE ChatBot in contextual English learning. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.785752>
- Chin, M., & Yap, J. R. (2024). Creating an inclusive second language writing classroom through multiliteracies pedagogy: A duoethnography study. *British Journal of Special Education*, 51(2), 156–164. <https://doi.org/10.1111/1467-8578.12504>
- Cortázar, C., Nussbaum, M., Harcha, J., Alvares, D., López, F., Goñi, J., & Cabezas, V. (2021). Promoting critical thinking in an online, project-based course. *Computers in Human Behavior*, 119, 106705. <https://doi.org/10.1016/j.chb.2021.106705>
- Fan, N., & Ma, Y. (2024). Effects of planning conditions on L2 writing in relation to task complexity. *SAGE Open*, 14(4). <https://doi.org/10.1177/21582440241297412>
- Ganapathy, M., Tan, D. a. L., & Phan, J. (2020). Impact of written corrective feedback on Malaysian ESL secondary students' writing performance. *3L the Southeast Asian Journal of English Language Studies*, 26(3), 139–153. <https://doi.org/10.17576/3L-2020-2603-11>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., Ray, S. (2021). An introduction to structural equation modeling. In: *Partial Least Squares Structural Equation Modeling (PLS-SEM) using R. Classroom Companion: Business*. Springer, Cham. https://doi.org/10.1007/978-3-030-80519-7_1
- Hair, J. F., Ringle, C. M., Gudergan, S. P., Fischer, A., Nitzl, C., & Menictas, C. (2019). Partial least squares structural equation modeling-based discrete choice modeling: An illustration in modeling retailer choice. *Business Research*, 12(1), 115-142.
- Hair Jr, J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: Updated guidelines on which method to use. *International Journal of Multivariate Data Analysis*, 1(2), 107-123.
- Halim, A., Nur, S., De Vega, N., Nasta, M., & Nurfadhilah, A. S. (2023). Exploring Heutagogy in Indonesian Higher Education: Cultural Challenges and Advantages in Mobile-Based English as a Foreign

- Language (EFL) Teaching. *Voices of English Language Education Society*, 7(3), 557–571. <https://doi.org/10.29408/veles.v7i3.22026>
- Hanafi, H., Pomalingo, R., & Bantulu, Y. (2023). Teacher's feedback on learners' English writing compositions. *Ideas Jurnal Pendidikan Sosial dan Budaya*, 9(2), 673. <https://doi.org/10.32884/ideas.v9i2.1268>
- Hasanah, N., Noviasmy, Y., Amalia, N., & Mazhur, M. (2023). Enhancing content development in EFL students' writing: Leveraging the four-square writing method. *International Journal of Multicultural and Multireligious Understanding*, 10(12), 188. <https://doi.org/10.18415/ijmmu.v10i12.5226>
- Hasnah, Y., Ginting, P., Supiatman, L., Kharisma, A. J., & Siahaan, H. S. (2023). How do locally produced EFL textbooks endorse critical thinking skills in Indonesia? A content analysis. *Journal of Language Teaching and Research*, 15(1), 190–200. <https://doi.org/10.17507/jltr.1501.21>
- Hinduja, P., Mohammad, R. F., & Siddiqui, S. (2024). Factors influencing students' academic self-efficacy in related domains. *SAGE Open*, 14(4). <https://doi.org/10.1177/21582440241289738>
- Indriyani, V., Ningsih, A. G., Henanggil, M. D. F., & Fathia, W. (2023). The effect of PjBL with oral corrective feedback on student scientific article writing skills. *Ta Dib*, 26(1), 85. <https://doi.org/10.31958/jt.v26i1.8652>
- Jiang, C., & Papi, M. (2021). The motivation-anxiety interface in language learning: A regulatory focus perspective. *International Journal of Applied Linguistics*, 32(1), 25–40. <https://doi.org/10.1111/ijal.12375>
- Kayaalp, F., Meral, E., Şimşek, U., & ŞahiN, İ. F. (2020). A search for a method to improve critical thinking skills in social studies teaching: Writing-to-Learn. *Review of International Geographical Education Online*. <https://doi.org/10.33403/rigeo.719222>
- Kim, S., Yang, J. W., Lim, J., Lee, S., Ihm, J., & Park, J. (2021). The impact of writing on academic performance for medical students. *BMC Medical Education*, 21(1), 61. <https://doi.org/10.1186/s12909-021-02485-2>
- Koltovskaia, S. (2022). Postsecondary L2 writing teachers' use and perceptions of Grammarly as a complement to their feedback. *ReCALL*, 35(3), 290–304. <https://doi.org/10.1017/s0958344022000179>
- Kondo, H., Nugroho, D. A., & Imansari, N. (2023). The effectiveness of Listen-Read-Discuss (LRD) on students' reading comprehension.

- Glens Global English Insights Journal, 1(1), 19–25.
<https://doi.org/10.61220/glens.v1i1.2023a3>
- Li, H. H., Zhang, L. J., & Parr, J. M. (2020). Small-group student talk before individual writing in tertiary English writing classrooms in China: Nature and insights. *Frontiers in Psychology*, 11.
<https://doi.org/10.3389/fpsyg.2020.570565>
- Li, R. (2022a). Understanding foreign language writing anxiety and its correlates. *Frontiers in Psychology*, 13.
<https://doi.org/10.3389/fpsyg.2022.1031514>
- Li, R. (2022b). Understanding foreign language writing anxiety and its correlates. *Frontiers in Psychology*, 13.
<https://doi.org/10.3389/fpsyg.2022.1031514>
- Linuwih, E. R., Setiawan, S., & Munir, A. (2024). Student engagement with teacher written feedback in online EFL writing context. *Theory and Practice in Language Studies*, 14(7), 2186–2192.
<https://doi.org/10.17507/tpls.1407.26>
- McDonald, R. P. (1996). Path analysis with composite variables. *Multivariate Behavioral Research*, 31(2), 239–270.
- Molina, D. V. T., Del Carmen Rosado Castro, M., Barrera, L. V. Q., & Velasco, Y. J. G. (2024). Gamification and its benefits for English vocabulary development in preschool children. *Reincisol*, 3(6), 5787–5802. [https://doi.org/10.59282/reincisol.v3\(6\)5787-5802](https://doi.org/10.59282/reincisol.v3(6)5787-5802)
- Nazari, N., Shabbir, M. S., & Setiawan, R. (2021). Application of Artificial Intelligence powered digital writing assistant in higher education: randomized controlled trial. *Heliyon*, 7(5), e07014.
<https://doi.org/10.1016/j.heliyon.2021.e07014>
- Nejad, M. E., Izadpanah, S., Namaziandost, E., & Rahbar, B. (2022). The mediating role of critical thinking abilities in the relationship between English as a foreign language learners' writing performance and their language learning strategies. *Frontiers in Psychology*, 13.
<https://doi.org/10.3389/fpsyg.2022.746445>
- Pertiwi, O. P. P., & Ashadi, A. (2024). Exploring EFL students' preferences on teachers' written corrective feedback in encouraging students' writing skills. *Enrichment Journal of Multidisciplinary Research and Development*, 2(8). <https://doi.org/10.55324/enrichment.v2i8.188>
- Putra, O., Lustyantje, N., & Iskandar, I. (2022). Word of wonders: crossword game-based in optimizing the students' vocabulary. *Darussalam English Journal (Dej)*, 2(1), 20–54.
<https://doi.org/10.30739/dej.v2i1.1494>
- Qasmi, A. M. B. A., Barwani, T. A., & Seyabi, F. A. (2022). Flipped classrooms and their effect on Omani students' vocabulary

- achievement and motivation towards learning English. *Journal of Education and Learning (EduLearn)*, 16(2), 152–163. <https://doi.org/10.11591/edulearn.v16i2.20324>
- Rasool, U., Qian, J., & Aslam, M. Z. (2024). Understanding the significance of EFL students' perceptions and preferences of written corrective feedback. *SAGE Open*, 14(2). <https://doi.org/10.1177/21582440241256562>
- Shahzad, M. F., Xu, S., & Asif, M. (2024). Factors affecting generative artificial intelligence, such as ChatGPT, use in higher education: An application of technology acceptance model. *British Educational Research Journal*. <https://doi.org/10.1002/berj.4084>
- Shen, X., Ismail, L., & Jeyaraj, J. J. (2024). Metacognitive strategies and writing proficiency: Mediating role of critical thinking skills in online learning mode during COVID-19. *Pertanika Journal of Social Science & Humanities*, 32(4). <https://doi.org/10.47836/pjssh.32.4.18>
- Shulgina, G., Costley, J., Shcheglova, I., Zhang, H., & Sedova, N. (2024). Online peer editing: The influence of comments, tracked changes and perception of participation on students' writing performance. *Smart Learning Environments*, 11(1). <https://doi.org/10.1186/s40561-024-00315-8>
- Slim, S. a. R., & Al-Omari, H. A. (2023). The effect of an instructional program of critical thinking skills on eleventh grade female students' English writing skills in Jordan. *Dirasat Educational Sciences*, 50(4), 198–210. <https://doi.org/10.35516/edu.v50i4.4370>
- Song, Y., & Xu, J. (2024). Variation in phrase frame structure and function in argumentative writing by EFL learners across different L1 backgrounds. *International Journal of Applied Linguistics*. <https://doi.org/10.1111/ijal.12625>
- Soodmand Afshar, H., Ranjbar, N. and Yenkimaleki, M. (2025). Written corrective feedback in language education: A qualitative meta-synthetic study. *Teaching English Language*, 19(1), 119-158. doi: 10.22132/tel.2024.450086.1581
- Sung, K. (2021). EFL Undergraduate and graduate learners' views on a writing intensive online subject matter course. *The Journal of AsiaTEFL*, 18(2), 520–543. <https://doi.org/10.18823/asiatefl.2021.18.2.9.520>
- Supiani, S., Mukminatien, N., Suharyadi, S., Muniroh, S., Widiati, U., and Sanggala Dewi, O. Tri (2025). Metalinguistic explanations and indirect written corrective feedback: Exploring EFL students' emotions, influencing factors, and perceptions. *Teaching English Language*, 19(2), 139-181. doi: 10.22132/tel.2025.468133.1659

- Susilo, A., Mufanti, R., & Fitriani, A. (2021). Promoting EFL students' critical thinking and self-voicing through CIRC technique in Academic Writing courses. *Studies in English Language and Education*, 8(3), 917–934. <https://doi.org/10.24815/siele.v8i3.21149>
- Tan, S., Cho, Y. W., & Wensi Xu. (2022). Exploring the effects of automated written corrective feedback, computer-mediated peer feedback and their combination mode on EFL learner's writing performance. *Interactive Learning Environments*. <https://doi.org/10.1080/10494820.2022.2066137>.
- Teng, M. F. (2024). Metacognitive Awareness and EFL learners' perceptions and experiences in utilising ChatGPT for writing feedback. *European Journal of Education*. <https://doi.org/10.1111/ejed.12811>
- Teng, M. F., & Yue, M. (2022). Metacognitive writing strategies, critical thinking skills, and academic writing performance: A structural equation modeling approach. *Metacognition and Learning*, 18(1), 237–260. <https://doi.org/10.1007/s11409-022-09328-5>
- Tusino, T., Faridi, A., Saleh, M., & Fitriati, S. (2020). The effect of hybrid Task-Based language teaching and critical thinking on writing performance in Indonesia. *The New Educational Review*, 61(3), 109–118. <https://doi.org/10.15804/tner.20.61.3.09>
- Vandeweerd, N., Housen, A., & Paquot, M. (2023). Proficiency at the lexis–grammar interface: Comparing oral versus written French exam tasks. *Language Testing*, 40(3), 658–683. <https://doi.org/10.1177/02655322231153543>
- Wahyudi, A., Sari, F., Amaliah, N., Pamuji, A., & Dharmawan, Y. Y. (2024). From critique to insight: Student voices on English writing feedback. *Voices of English Language Education Society*, 8(1), 282–292. <https://doi.org/10.29408/veles.v8i1.25659>
- Wahyuni, S., & Umam, C. (2018). An analysis on writing anxiety of Indonesian EFL college learners. *JEELS (Journal of English Education and Linguistics Studies)*, 4(1), 105–128. <https://doi.org/10.30762/jeels.v4i1.333>
- Wale, B. D., & Bishaw, K. S. (2020). Effects of using inquiry-based learning on EFL students' critical thinking skills. *Asian-Pacific Journal of Second and Foreign Language Education*, 5(1). <https://doi.org/10.1186/s40862-020-00090-2>
- Wei, P., Wang, X., & Dong, H. (2023). The impact of automated writing evaluation on second language writing skills of Chinese EFL learners: a randomized controlled trial. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1249991>

- Wei, W., & Cao, Y. (2020a). Written corrective feedback strategies employed by university English lecturers: A Teacher Cognition Perspective. *SAGE Open*, 10(3). <https://doi.org/10.1177/2158244020934886>
- Wei, W., & Cao, Y. (2020b). Written corrective feedback strategies employed by university English lecturers: A Teacher Cognition Perspective. *SAGE Open*, 10(3). <https://doi.org/10.1177/2158244020934886>
- Widyaningrum, H. K. (2020). Flipped classroom learning innovation and critical thinking ability of students on argumentation writing skills. *Retorika Jurnal Bahasa Sastra dan Pengajarannya*, 13(1), 174. <https://doi.org/10.26858/retorika.v13i1.10558>
- Wu, Y., & Schunn, C. D. (2020). The effects of providing and receiving peer feedback on writing performance and learning of secondary school students. *American Educational Research Journal*, 58(3), 492–526. <https://doi.org/10.3102/0002831220945266>
- Xiaolei, S., Ismail, L., Yurong, H., & Mengqi, W. (2023). Strategies of content knowledge representation and EFL learners' English writing proficiency: Mediating role of critical thinking skills. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4593923>
- Xu, J. (2021). Chinese university students' L2 writing feedback orientation and self-regulated learning writing strategies in online teaching during COVID-19. *The Asia-Pacific Education Researcher*, 30(6), 563–574. <https://doi.org/10.1007/s40299-021-00586-6>
- Xu, J., Zhang, S., & Chen, H. (2024). The impact of teacher autonomy support on students' assessment literacy: The chain mediating effects of self-efficacy and critical reflection. *Heliyon*, 10(14), e34616. <https://doi.org/10.1016/j.heliyon.2024.e34616>
- Yang, H., & Kyun, S. (2022). The current research trend of artificial intelligence in language learning: A systematic empirical literature review from an activity theory perspective. *Australasian Journal of Educational Technology*, 180–210. <https://doi.org/10.14742/ajet.7492>
- Yao, Y., Sun, Y., Zhu, S., & Zhu, X. (2024). A qualitative inquiry into metacognitive strategies of postgraduate students in employing CHATGPT for English Academic Writing. *European Journal of Education*. <https://doi.org/10.1111/ejed.12824>
- Yu, S. (2024). Improving writing teacher feedback literacy: The role of an L2 writing teacher education course. *European Journal of Education*, 59(4). <https://doi.org/10.1111/ejed.12705>

- Zhan, J., Sun, Q., & Zhang, L. J. (2021). Effects of manipulating writing task complexity on learners' performance in completing vocabulary and syntactic tasks. *Language Teaching Research*, 28(3), 1011–1032. <https://doi.org/10.1177/13621688211024360>
- Zhang, T., Chen, X., Hu, J., & Ketwan, P. (2021). EFL students' preferences for written corrective feedback: Do error types, language proficiency, and foreign language enjoyment matter? *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.660564>
- Zhang, Z., & Hyland, K. (2021). Fostering student engagement with feedback: An integrated approach. *Assessing Writing*, 51, 100586. <https://doi.org/10.1016/j.asw.2021.100586>
- Zhong, W. (2024). Effectiveness of finetuning pretrained BERT and deBERTa for automatic essay scoring. *Applied and Computational Engineering*, 52(1), 87–95. <https://doi.org/10.54254/2755-2721/52/20241321>



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