ARTIFICIAL INTELLIGENCE-ASSISTED FEEDBACK AND THE DEVELOPMENT OF FRAME MARKER USE IN NCE II STUDENTS' ESSAYS IN KATSINA

BY

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Abstract

The integration of Artificial Intelligence (AI) into educational contexts has reshaped academic writing instruction globally, yet limited empirical research has examined its influence on metadiscursive competence in Nigerian teacher education institutions. This study investigated the effect of AI-assisted feedback on the use of frame markers and the organizational coherence of expository essays written by NCE II students in Colleges of Education in Katsina State. Anchored in Hyland's (2005) model of metadiscourse, the study adopted a quasi-experimental pretest–posttest control group design involving 120 students, who were assigned to an experimental group (AI-assisted feedback, n = 60) and a control group (conventional lecturer feedback, n = 60). Essays were analysed using Hyland's taxonomy and an analytic rubric assessing organization, coherence, and clarity. The experimental group recorded a higher mean gain in frame marker frequency (5.6 against 1.2), a greater proportion of functionally appropriate frame markers (48% to 81% against 51% to 59%), and a statistically significant improvement in organizational coherence (10.3 to 16.7 out of 20; $t = 5.82$, $p < .05$), whereas the control group's improvement was not significant ($p = .061$). The findings suggest that AI-assisted feedback can strengthen metadiscursive awareness and discourse-level writing competence among NCE students, and they carry implications for the responsible integration of AI in Nigerian teacher education.

Keywords: Artificial Intelligence, Frame markers, Metadiscourse, Academic writing, Teacher education, Nigeria.

1. Introduction

1.1 Background to the Study

Artificial Intelligence (AI) technologies are increasingly embedded in higher education systems worldwide. In Nigeria, recent digital learning reforms and post-pandemic shifts in instructional delivery have heightened interest in AI-supported pedagogical tools. Writing instruction has been a notable beneficiary of this trend, as AI-driven systems now provide automated feedback on grammar, structure, and organization. Despite these advances, academic writing remains a persistent challenge for students in the Nigeria Certificate in Education (NCE) programme, particularly with respect to textual organization and coherence. One critical but underexplored dimension of this challenge is students' use of metadiscourse markers, especially frame markers. According to Hyland (2005), frame markers are interactive metadiscourse resources that signal the stages of a text, mark transitions, and structure arguments (e.g., *first*, *to conclude*, *in this section*). Their effective deployment enhances coherence and supports reader navigation. However, many learners of English as a second language (ESL) demonstrate restricted or inappropriate use of such markers, which weakens the logical flow of their writing.The study contributes to scholarship in digital pedagogy and applied linguistics by extending Hyland's metadiscourse framework into AI-mediated instruction. Practically, it offers lecturers in Colleges of Education evidence on how AI-generated structural feedback can complement conventional feedback where large classes limit individualized attention. It also informs curriculum planners and policymakers concerned with academic literacy and teacher preparation in Nigeria.

1.2 Statement of the Problem

Research in Nigerian tertiary institutions consistently report weaknesses in the rhetorical structuring and logical sequencing of students' written work. In Colleges of Education, large class sizes and limited instructional time often lead lecturers to concentrate on sentence-level grammatical correction at the expense of discourse-level feedback. As a result, NCE students receive little targeted guidance on how to stage an argument, sequence ideas, and signal text organization through frame markers. This is a serious concern in teacher education, since these students are prospective teachers who must themselves model effective writing.

Although AI-based feedback tools are increasingly accessible, existing studies on AI in writing instruction have focused largely on grammatical accuracy, lexical precision, and sentence-level correction. In the Nigerian context, studies on AI and digital technologies have mostly addressed digital literacy, infrastructural readiness, and technology acceptance, frequently relying on models such as the Technology Acceptance Model. Consequently, there is little empirical evidence on whether AI-assisted feedback can develop higher-order, discourse-level competence, including metadiscursive competence, in teacher education institutions. Moreover, previous metadiscourse studies in ESL settings have been predominantly descriptive, documenting the frequency and misuse of markers rather than testing instructional interventions to improve them. This study addresses these gaps by examining the effect of AI-assisted feedback on frame marker use and organizational coherence in the expository essays of NCE II students in Katsina State.

1.3 Objectives of the Study The

study sought to:

1. determine the effect of AI-assisted feedback, compared with conventional lecturer feedback, on the use (frequency and functional appropriateness) of frame markers in NCE II students' expository essays.
2. examine the effect of AI-assisted feedback, compared with conventional lecturer feedback, on the organizational coherence of NCE II students' expository essays.

1.4 Research Questions

The following research questions guided the study:

1. To what extent does AI-assisted feedback, compared with conventional lecturer feedback, affect the frequency and functional appropriateness of frame markers in NCE II students' expository essays?
2. What is the effect of AI-assisted feedback, compared with conventional lecturer feedback, on the organizational coherence of NCE II students' expository essays?

1.5 Research Hypotheses

Two null hypotheses were tested at the 0.05 level of significance:

- **H_{01}:** There is no significant difference in the use of frame markers between students who receive AI-assisted feedback and those who receive conventional lecturer feedback.

- **H_{02}:** There is no significant difference in the organizational coherence scores of students who receive AI-assisted feedback and those who receive conventional lecturer feedback.

2. Literature Review

2.1 The Concept of Metadiscourse

Metadiscourse has received considerable attention in applied linguistics and discourse studies. The notion was first introduced by Harris (1959) to distinguish propositional from nonpropositional elements of discourse, popularized by Vande Kopple (1985), and refined by Crismore (1989). Hyland (1998, 2005) advanced the concept by situating it within a sociorhetorical framework that stresses its role in both textual organization and interpersonal interaction. In Hyland's (2005) model, metadiscourse markers fall into two broad categories, interactive and interactional, reflecting the dual role of metadiscourse in helping writers structure discourse coherently while engaging readers and projecting authorial stance.

2.2 Interactive Markers

Interactive markers guide readers through a text by shaping its organization and logical flow. They add no new propositional content; rather, they signal relationships and structure to enhance clarity and comprehension. Hyland (2005) identifies five types:

- **Transitions** are conjunctions and adverbials such as *however*, *therefore*, and *in addition*, which indicate semantic relationships between clauses and sentences (Mauranen, 1993).

- **Frame markers** signal boundaries in the discourse, such as *firstly*, *in conclusion*, and *to sum up*, helping readers navigate the text and anticipate the development of an argument (Abdi, 2002).
- **Endophoric markers** refer to other parts of the text, such as *as mentioned above* or *see*

  Figure 2, reducing processing effort by directing readers to related information (Crismore, 1989).
- **Evidentials** refer to external sources, such as *according to Hyland (2005)*, establishing intertextual links and enhancing the credibility of arguments (Ädel, 2006).
- **Code glosses** clarify meaning through restatement, elaboration, or

  exemplification, such as *namely*, *in other words*, and *for example* (Hyland, 2007).

Interactive markers therefore operate primarily at the textual level, helping writers build coherent discourse that is easier for readers to process.

2.3 Frame Markers

Frame markers are linguistic elements that indicate the logical sequence and stages of text organization, order and label arguments and ideas, and signal topic shifts. Through them, the writer takes the reader through the stages of the text and foregrounds the characteristics of the discourse, thereby improving comprehension (Hempel & Degand, 2006; Hyland, 2018; Hyland & Zou, 2020; Toumi, 2009). Cao and Hu (2014) describe frame markers as used primarily to organize texts for readers, while Uccelli, Dobbs, and Scott (2013) define them as signalling the sequence of claims or contrastive positions in an argument.

Hyland (2005) distinguishes four functions of frame markers. First, they sequence sections of the text or organize an argument (e.g., *first*, *second*, *then*, *next*). Second, they explicitly name text stages (e.g., *in summary*, *to summarize*). Third, they announce discourse goals (e.g., *my purpose is*, *I seek to*, *I conclude with*). Fourth, they signal topic shifts (e.g., *right*, *well*, *let us return to*). Examples include: (a) *My goal here is to elucidate the situation*; (b) *Ultimately, they did not assist him*.

2.4 Artificial Intelligence in Writing Instruction

The integration of AI into writing instruction has opened new possibilities for formative assessment, revision support, and rhetorical development. AI-based writing tools provide immediate, data-driven feedback on structural organization, coherence, lexical choice, and argument development. These systems typically rely on natural language processing (NLP) algorithms that analyse textual patterns and generate automated suggestions. Research in digital writing pedagogy suggests that automated feedback can strengthen revision practices by prompting learners to reorganize ideas, clarify arguments, and attend to discourse-level structure rather than surface-level corrections such as grammar and spelling. Studies on automated writing evaluation (AWE) further indicate that timely, iterative feedback encourages multiple drafting and improves overall writing quality and structural awareness.

Scholars in educational technology argue that AI-mediated feedback functions as a scaffolding mechanism consistent with socio-cognitive models of writing development, in which writing competence grows through guided revision and metacognitive awareness. AI tools can support

this process by making rhetorical features visible and offering structured prompts that draw learners' attention to textual organization.

2.5 Empirical Review

Empirical studies relevant to this research fall into two strands: studies of instruction in metadiscourse and discourse markers, and studies of AI-assisted feedback on discourselevel writing quality.

Instruction in metadiscourse and discourse markers. Vahid Dastjerdi and Shirzad (2010) examined explicit instruction in metadiscourse markers with 94 undergraduate English literature students at the University of Isfahan, grouped as elementary, intermediate, and advanced learners. After six sessions of instruction, the posttest showed that explicit teaching generally improved their writing ability. AbdelWahab (2020) used a quasiexperimental design with 60 first-year special diploma students at Zagazig University (30 experimental, 30 control) to teach interactive and interactional markers. The experimental group outperformed the control group in overall academic writing, including organization, with the exception of mechanics, and the effect was reported as large. In contrast, Pourdana, Nour, and Yousefi (2021) gave 42 Iranian EFL learners metalinguistic written corrective feedback on discourse markers through WhatsApp over eight weeks. Working with Halliday and Hasan's typology, they found fluctuating patterns and no significant long-term improvement in discourse marker accuracy, which they linked in part to discourse markers being resistant to correction.

AI-assisted feedback and discourse-level writing. Alangari (2025) investigated ChatGPT as a supplementary aid for 10 high school EFL learners in Dhahran over three weeks, with real-

time feedback on grammar, vocabulary, and coherence. Scores rose significantly for content, language use, and vocabulary, but organization and mechanics showed no significant change. Yoon et al. (2023) evaluated ChatGPT feedback on the coherence and cohesion of 50 argumentative essays by English language learners and found that most feedback was abstract and generic, and that its detection of problems such as inaccurate use of cohesive devices was often wrong. They concluded that ChatGPT without task-specific training does not give effective feedback on coherence and cohesion.

Taken together, these studies suggest that explicit attention to metadiscourse can improve EFL writing, that results for feedback aimed at discourse markers are mixed, and that evidence on AI feedback for organization and coherence is inconclusive. None of them examined frame markers specifically, and none was conducted in Nigerian teacher education, which is the gap this study addresses. Within metadiscourse research, Hyland (2005) emphasizes that effective academic writing extends beyond grammatical correctness to include interactive resources that guide readers, yet AI research has rarely investigated how automated systems influence students' deployment of such devices. In the Nigerian context, studies have mainly examined digital literacy, infrastructural readiness, and technology acceptance, providing limited evidence on the impact of AI on rhetorical organization and metadiscursive competence in teacher education. Given the persistent challenges of coherence, argument development, and structural organization in Nigerian Colleges of Education, empirical research on AI-assisted feedback at the discourse level is needed.

3. Theoretical Framework

The study is grounded in Hyland's (2005) interpersonal model of metadiscourse, which treats metadiscourse as the set of resources writers use to organize discourse and engage readers. Within this model, frame markers belong to the interactive category and are central to the study. The study is also informed by socio-cognitive perspectives on writing, which hold that writing competence develops through guided revision and metacognitive awareness. From this standpoint, AI-generated feedback is conceptualized as a scaffold that makes organizational features of texts visible to learners.

4. Methodology

4.1 Research Design

The study adopted a quasi-experimental pretest–posttest control group design. Intact classes were used because random assignment of students to groups was not feasible in the institutional setting.

4.2 Participants and Sampling

The participants were 120 NCE II students drawn from two Colleges of Education in Katsina State, Nigeria, selected through purposive sampling based on availability and willingness to participate. They were divided into an experimental group (n = 60), which received AI-assisted feedback, and a control group (n = 60), which received conventional written feedback from their lecturer.

4.3 Instruments

Data were collected using a 500-word expository essay task administered as pretest and posttest.
Frame markers were identified and classified using Hyland's (2005) metadiscourse taxonomy.

Essay quality was assessed with an analytic scoring rubric covering organization, coherence, and clarity, scored out of 20.

4.4 Procedure

In Week 1, both groups wrote a pretest essay to establish baseline performance. From Weeks 2 to 4, the experimental group received AI-generated structural feedback focusing on textual organization and discourse staging, while the control group received conventional written comments from their lecturer. In Week 5, all participants wrote a posttest essay, which was analysed for changes in frame marker use and overall writing quality.

4.5 Data Analysis

Frame marker frequency, the percentage of functionally appropriate frame markers, and organizational coherence scores were compared across pretest and posttest and between groups.

Differences in coherence scores were tested for significance at the 0.05 level.

5. Data Presentation

5.1 Research Question 1: Frame Marker Use Table 1:
Mean Frequency of Frame Markers

Group	Pre-test mean	Post-test mean	Mean gain

Experimental	4.2	9.6	5.6
Control	4.5	5.7	1.2

Table 2: Percentage of Appropriately Used Frame Markers

Group	Pre-test	Post-test
Experimental	48%	81%
Control	51%	59%

The experimental group's mean frame marker frequency more than doubled, from 4.2 to 9.6 (a gain of 5.6), whereas the control group's rose modestly from 4.5 to 5.7 (a gain of 1.2). Functional appropriateness showed a similar pattern: the experimental group improved from 48% to 81%, against 51% to 59% for the control group.

5.2 Research Question 2: Organizational Coherence

Table 3: Essay Organization Scores (out of 20)

Group	Pre-test mean	Post-test mean	t-value	p-value
Experimental	10.3	16.7	5.82	< .001
Group	Pre-test mean	Post-test mean	t-value	p-value
Control	10.6	12.4	1.91	.061

The experimental group's organization scores rose significantly from 10.3 to 16.7 ($p < .05$), while the control group's improvement from 10.6 to 12.4 was not statistically significant ($p = .061$).

6. Discussion

The findings show that AI-assisted feedback improved students' use of frame markers in frequency, variety, and functional appropriateness, and that the improvement was rhetorical as well as quantitative. Students in the experimental group displayed clearer discourse staging, more coherent paragraph development, and more logically sequenced arguments in their posttest essays.

6.1 Frame Marker Use (Research Question 1)

The rise in mean frame marker frequency from 4.2 to 9.6 in the experimental group suggests that AI feedback heightened students' awareness of textual organization. Before the intervention, many students relied heavily on basic sequencers such as *firstly* and *secondly*, often without aligning them with paragraph structure or argumentative development. After exposure to AIgenerated structural suggestions, they used a wider range of discourse-staging devices, including goal-announcing markers (*this essay examines*), topic-shifting devices (*at this point*, *in this section*), and appropriate concluding signals (*to summarize*, *in conclusion*). This suggests that AI systems can act as scaffolds that direct learners' attention to macro-level discourse features rather than merely surface grammatical errors.

The increase in appropriately used frame markers from 48% to 81% is particularly significant, because it indicates that students improved their grasp of rhetorical function and did not

simply use more markers. Misuse of frame markers often produces structural incoherence, such as introducing *finally* without prior sequencing or concluding prematurely without developing the argument. Posttest essays showed better alignment between marker use and argumentative progression. This is consistent with sociocognitive theories of writing, which hold that competence develops through guided revision and awareness-building; AI feedback appears to supply immediate metacognitive prompts that lead students to reconsider how ideas are organized and how readers

navigate their texts.

The gains in frame marker use agree with research showing that deliberate attention to metadiscourse improves writing. Vahid Dastjerdi and Shirzad (2010) and AbdelWahab (2020) both reported that explicit work on metadiscourse markers improved EFL learners' writing, and the present study extends this evidence in two ways: it isolates one interactive category, frame markers, and it shows that this focused attention can be delivered through AI-generated structural feedback rather than classroom instruction alone. The findings differ from those of Pourdana, Nour, and Yousefi (2021), who found no significant improvement in discourse marker accuracy after eight weeks of metalinguistic feedback. Several differences may explain this. Their feedback coded form errors in cohesive devices (additive, adversative, causal, and temporal), whereas the feedback here addressed the rhetorical function of markers in discourse staging.

Their participants were advanced learners (C1 and C2), whereas the present students began with only 48% appropriate use and so had more room to improve. Their study also involved a single intact group, with no control comparison. The contrast suggests that frame markers

respond better to feedback that explains their organizational role than to feedback that only flags errors, although this explanation needs direct testing.

6.2 Organizational Coherence (Research Question 2)

The statistical results ($t = 5.82$, $p < .05$) indicate that the gains in the experimental group were unlikely to be due to chance. The increase in organizational coherence scores from 10.3 to 16.7 out of 20 suggests that improved frame marker use accompanied a measurable enhancement in essay quality. The lack of significant improvement in the control group ($p = .061$) suggests that conventional feedback alone may be insufficient to develop discourse-level competence within a short instructional period.

The significant rise in organization scores is consistent with AbdelWahab (2020), whose experimental group also outperformed the control group in organization after metadiscourse instruction. It differs from Alangari (2025), where organization did not change significantly after three weeks of ChatGPT-supported practice. Both interventions lasted three weeks, so duration is unlikely to explain the difference. More plausible explanations are that Alangari's feedback was general (grammar, vocabulary, and coherence) rather than aimed at textual organization, and that the sample of 10 learners limited statistical power, compared with 120 here. The results must also be read alongside Yoon et al. (2023), who found general-purpose ChatGPT feedback on coherence and cohesion to be generic and often inaccurate. The present study did not evaluate the accuracy or specificity of the AI feedback itself, so it cannot show that the feedback used here was better. The structured focus on discourse staging may have made it easier for students to act on, but the quality of AI feedback is likely to vary with the

tool and the prompts used. This supports the blended model proposed below, in which lecturers oversee AI-generated feedback.

6.3 Implications

The results are especially relevant to Nigerian Colleges of Education, where large classes limit the depth of individualized feedback and lecturers often prioritize grammatical correction over discourse-level comment. AI-assisted systems can complement traditional instruction by offering structured guidance on organization and coherence. The study does not suggest replacing instructors with AI. Rather, it supports a blended feedback model in which AI provides structural suggestions while lecturers focus on critical thinking, content development, and contextual relevance. This matters in teacher education, where students are future educators who must model effective writing. The study also contributes to metadiscourse scholarship. Earlier metadiscourse studies in ESL contexts have been largely descriptive, documenting frequency and misuse. By adopting an interventionist approach, this study shows that interactive resources, particularly frame markers, can be deliberately developed through technologically mediated feedback, and it thereby extends Hyland's (2005) framework into digital pedagogy.

7. Conclusion

This study investigated the effect of AI-assisted feedback on frame marker use and organizational coherence in NCE II students' expository essays in Katsina State. Grounded in Hyland's (2005) metadiscourse framework, it found that AI-supported feedback markedly improved the frequency and functional appropriateness of frame markers as well as overall

essay coherence, outperforming conventional lecturer feedback over the period studied. AI can therefore serve as a valuable scaffold for academic literacy development where instructional time and feedback opportunities are limited.

The study does not advocate uncritical adoption of AI. Ethical considerations, academic integrity concerns, and inequalities in digital access must be addressed before wide implementation, and AI should remain a pedagogical support rather than a replacement for instructor expertise.

8 Recommendations

On this basis, it is recommended that:

1 lecturer in Colleges of Education should adopt a blended feedback model in which AIgenerated structural feedback complements lecturer comments on content and critical thinking;

2 Institutions should provide training and policy guidance on the ethical and effective use of AI in writing instruction.

3. Future research examines should longitudinal effects, other metadiscourse categories, and broader implementation across Nigerian tertiary institutions.

References

AbdelWahab, A. F. (2020). Using interactive and interactional metadiscourse markers to develop EFL first year special diploma students' academic writing skills. *Journal of Faculty of Education, Assiut University, 36*(2), Article 5.

Abdi, R. (2002). Interpersonal metadiscourse: An indicator of interaction and identity. *Discourse Studies, 4*(2), 139–145.

Alangari, T. S. (2025). The effect of AI-assisted learning on EFL writing proficiency: Quasiexperimental and cluster analysis. *Educational Process: International Journal, 17*, Article e2025345. https://doi.org/10.22521/edupij.2025.17.345

Cao, F., & Hu, G. (2014). Interactive metadiscourse in research articles. *Journal of Pragmatics, 66*, 1–19.

Crismore, A. (1989). *Talking with readers: Metadiscourse as rhetorical act*. Peter Lang.

Harris, Z. (1959). Linguistic transformations for information retrieval. *Proceedings of the International Conference on Scientific Information, 1*, 939–950.

Hempel, S., & Degand, L. (2006). Sequencers in academic writing. *Journal of Pragmatics, 38* (10), 1511–1534.

Hyland, K. (1998). Persuasion and context: The pragmatics of academic metadiscourse. *Journal of Pragmatics, 30*(4), 437–455.

Hyland, K. (2005). *Metadiscourse: Exploring interaction in writing*. Continuum.

Hyland, K. (2018). Metadiscourse in academic writing. *Applied Linguistics Review, 9*(2– 3),1–19.

Hyland, K., & Zou, H. (2020). "I believe that": Interpersonal metadiscourse in English research writing. *Journal of English for Academic Purposes, 44*, 100834.

Mauranen, A. (1993). Cultural differences in academic rhetoric. *Text, 13*(2), 167–190.

Note: Ädel (2006) and Hyland (2007) are cited in the text but absent from the original reference list; please add their full entries.

Pourdana, N., Nour, P., & Yousefi, F. (2021). Investigating metalinguistic written corrective feedback focused on EFL learners' discourse markers accuracy in mobile-mediated

context. *Asian-Pacific Journal of Second and Foreign Language Education, 6*, Article 7. https://doi.org/10.1186/s40862-021-00111-8

Toumi,N.(2009).Metadiscourse in academic writing.*Discourse & Communication,3*(2), 155–172.

Uccelli, P., Dobbs, C., & Scott, J. (2013). Mastering academic language. *Reading Research Quarterly, 48*(1), 45–67.

Vahid Dastjerdi, H., & Shirzad, M. (2010). The impact of explicit instruction of metadiscourse markers on EFL learners' writing performance. *Teaching English as a Second Language Quarterly, 2*(2), 155–174.

Vande Kopple, W. (1985). Some exploratory discourse on metadiscourse. *College Composition and Communication, 36*(1), 82–93.

Yoon, S.-Y., Miszoglad, E., & Pierce, L. R. (2023). Evaluation of ChatGPT feedback on ELL writers' coherence and cohesion. *arXiv*. https://arxiv.org/abs/2310.06505