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Discourse Markers in Academic Writing: A Comparative Study of Native and Non-Native English Writers

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ABSTRACT: This corpus-based comparative study examines how native and non-native English writers use discourse markers in academic writing and how these markers shape cohesion, coherence, argument development, and academic style. The corpus contains 120 texts (480,000 words) organized into two balanced subcorpora: a native-English subcorpus and a non-native-English subcorpus, each including research articles, postgraduate thesis chapters, and graduate-level scholarly papers from comparable disciplinary and genre conditions. Drawing on corpus linguistics, discourse analysis, academic writing research, contrastive rhetoric, and second-language writing, the study focuses on additive, contrastive, causal-resultative, sequential, elaborative, and conclusive discourse markers. The analysis combines normalized frequency profiling, log-likelihood comparison, percentage distribution, dispersion checks, category-based coding, and qualitative functional discourse analysis of selected extracts. Within the analyzed corpus, the non-native-English subcorpus shows higher normalized discourse-marker frequency, especially in additive and causal-resultative categories, while also relying on a narrower and more repetitive marker repertoire. The native-English subcorpus shows lower overall marker density, broader functional distribution, and more frequent elaborative marking in contexts requiring explanation or reformulation. Qualitative analysis shows that rhetorical fit is more important than frequency alone: markers strengthen coherence when they accurately signal logical relations, but they weaken academic style when inserted mechanically, repeated redundantly, or used to imply unsupported causality or contrast. The study offers an evidence-linked comparative framework for analyzing discourse markers as rhetorical resources in academic writing and provides pedagogical implications for EFL and ESL instruction.

Keywords: discourse markers; academic writing; corpus linguistics; non-native English writers; textual coherence

I. INTRODUCTION

Academic writing depends on more than grammatical accuracy, sentence-level correctness, or the mechanical placement of transition words. It requires writers to organize knowledge for readers, signal relations among claims, manage the movement from evidence to interpretation, and establish a coherent rhetorical path through complex arguments. Discourse markers such as however, therefore, in addition, thus, for example, nevertheless, and on the other hand are central to this process because they make relations between propositions visible. In academic writing, these markers form part of the textual architecture that makes scholarly argument readable, persuasive, and discipline-sensitive [1].

The importance of discourse markers becomes clearer when we understand academic writing as a socially situated register rather than a neutral container of information. Corpus-based studies of academic language show that scholarly prose is shaped by discipline, genre, rhetorical purpose, writer expertise, and the intended readership's expectations [2]. A connector that is appropriate in a graduate assignment may be

excessive in a journal article; a marker that is useful in a literature review may be less suitable in a methods section; and a sequence marker that guides a thesis chapter may sound formulaic in a compressed research-article discussion. Thus, studying discourse markers requires attention not only to frequency but also to function, position, register, and rhetorical fit.

In applied linguistics and second-language writing, discourse markers matter because they sit at the intersection of linguistic form, academic literacy, and rhetorical competence. Non-native English writers often write within international academic systems where English dominates publication, supervision, assessment, and peer review. Evaluators assess their writing not only for grammatical accuracy but also for coherence, argument development, textual flow, and conformity with genre expectations. At the same time, international academic English should not be reduced to a single native-speaker norm. Native and non-native writing are better understood as text groups shaped by different educational histories, rhetorical conventions, disciplinary expectations, and degrees of exposure to academic English.

Metadiscourse and academic writing research shows that textual guidance is one way writers negotiate relationships with readers [3], [4]. A highly explicit style may support clarity in some contexts, especially for complex arguments or international readerships. However, excessive or repetitive marking may create list-like progression and reduce the sophistication of academic prose. Similarly, implicit cohesion may appear concise in some expert writing but may become difficult when argument relations are not sufficiently signaled. The central issue is whether writers use markers selectively, accurately, and in ways that match the discourse relation being constructed.

The present study compares three academic text types: peer-reviewed research articles, postgraduate thesis chapters, and graduate-level scholarly papers. This choice is deliberate. Research articles represent compressed published academic argument; thesis chapters represent extended supervised research writing; and graduate papers represent advanced academic writing produced in instructional settings. The comparison therefore captures different points on the continuum from student writing to published research. Genre differences are controlled by balancing text types across the two subcorpora, normalizing word counts, removing paratextual material, and interpreting findings by genre as well as writer group [5].

The international research gap is specific. Previous studies often examine linking adverbials, metadiscourse, learner writing, or academic genre separately. Fewer studies integrate balanced native/non-native corpus comparison, normalized frequency, statistical comparison, functional coding, extract-level discourse analysis, and pedagogical interpretation within one coherent design. This study addresses that gap by treating discourse markers as rhetorical resources whose value depends on distribution, range, semantic relation, and contextual fit. It therefore contributes to corpus linguistics, discourse analysis, second language writing, academic literacy research, and EFL/ESL writing pedagogy.

II. RESEARCH PROBLEM

The research problem is that academic writing instruction often presents discourse markers as fixed linking expressions, while in scholarly discourse they operate as context-sensitive rhetorical resources. This gap between teaching practice and discourse function can lead to mechanical insertion, a restricted range of markers, excessive repetition, and weak alignment between the marker and the intended semantic relation. The measurable problem this study addresses is therefore not only overuse or underuse, but also functional mismatch between the discourse marker and the rhetorical relation. In this study, misuse refers to rhetorical mismatch between marker and discourse relation, not simply grammatical error. If a causal marker appears without sufficient evidence, a contrastive marker introduces a simple topic shift, or additive markers accumulate without hierarchy, textual cohesion may appear on the surface while coherence remains rhetorically fragile.

A second aspect of the problem concerns interpretation. Native/non-native comparisons can easily become deficit-based if native writing is treated as the unquestioned standard of academic quality. However, multilingual academic writers may use explicit discourse marking for legitimate reasons, including reader guidance, educational training, genre expectations, and international audience awareness. A rigorous study must connect frequency patterns with functional evidence rather than relying on general claims about overuse or misuse. Frequency-only studies are insufficient for advanced applied-linguistics research because they cannot show whether a marker is rhetorically appropriate in its local discourse context.

III. RESEARCH AIM, OBJECTIVES, AND QUESTIONS

1. RESEARCH AIM AND OBJECTIVES

This study aims to compare how native and non-native English writers use discourse markers in academic writing and to explain how these markers contribute to cohesion, coherence, argument progression, and academic style across comparable academic genres. This aim is operationalized through the following objectives:

- To compare the normalized frequency, distribution, and range of discourse markers in native and non-native English academic writing.
- To classify discourse markers into additive, contrastive, causal-resultative, sequential, elaborative, and conclusive categories and examine their communicative functions.
- To identify patterns of overuse, underuse, restricted repertoire, and functional mismatch while also recognizing effective non-native uses.
- To examine how discourse markers support or weaken textual cohesion, coherence, reader guidance, argument development, and academic style.
- To translate the corpus-based and discourse-analytic findings into evidence-based implications for EFL and ESL academic writing instruction.

2. RESEARCH QUESTIONS

- RQ1. How do native and non-native English writers differ in the normalized frequency and range of discourse markers in academic writing?
- RQ2. How are additive, contrastive, causal-resultative, sequential, elaborative, and conclusive discourse markers distributed across the two writer groups?
- RQ3. Which discourse markers appear overused, underused, or functionally mismatched in non-native academic writing, and how do these patterns appear in extract-level context?
- RQ4. What implications do the quantitative and qualitative findings have for coherence, argument progression, academic style, and corpus-informed EFL/ESL writing pedagogy?

IV. LITERATURE REVIEW

1. DISCOURSE MARKERS AND METADISCOURSE IN ACADEMIC WRITING

Studies of conjunctive adverbials and linking adverbials have provided direct evidence for the present study. Chen's analysis of advanced Taiwanese EFL academic writing found that learner writers may overuse certain conjunctive adverbials and rely heavily on a limited set of connectors compared with published academic writing [6]. Liu's across-register corpus study showed that linking adverbials differ substantially across registers, so frequency alone cannot determine appropriateness [7]. Dafouz-Milne's cross-linguistic work on metadiscourse also showed that textual and interpersonal markers contribute to persuasion and audience orientation [8].

Research on research article abstracts and academic essays has further shown that metadiscourse varies by genre and rhetorical stage. Gillaerts and Van de Velde found diachronic change in interactional metadiscourse in research article abstracts, indicating that academic rhetorical conventions evolve over time [9]. Bruce's work on essays in sociology and English showed that even within university writing, disciplinary expectations shape textual and discoursal resources [10]. Abdi, Rizi, and Tavakoli developed a genre-sensitive account of metadiscourse based on discourse-community expectations [11].

These studies show that discourse markers cannot be evaluated in isolation. They must be interpreted through genre, section, discipline, and reader expectation. The present study builds on this cluster by comparing marker frequency with local rhetorical function, treating metadiscourse as both a countable corpus feature and an interpretive resource in academic argumentation.

2. CORPUS-BASED ACADEMIC WRITING RESEARCH

Corpus-based research shows that academic writing is not a single, uniform register. Mur-Duenas showed that English and Spanish research articles differ in metadiscourse features, indicating that rhetorical preferences vary across academic cultures [12]. Lei's study of Chinese doctoral dissertations in applied

linguistics found distinctive patterns of linking adverbial use when compared with published research articles [13]. Leedham and Cai's corpus-based analysis of Chinese students' linking adverbials in UK universities found strong reliance on forms such as besides and on the other hand, partly reflecting the influence of teaching materials [14].

Further work has refined this picture by emphasizing disciplinary and paradigmatic variation. Cao and Hu showed that interactive metadiscourse in research articles is influenced by both discipline and research paradigm [15]. Aull and Lancaster showed that stance markers differ between early and advanced academic writing, suggesting rhetorical development is gradual rather than binary [16]. Kawase found that PhD thesis introductions and research article introductions use metadiscourse differently, even when produced by comparable research writers [17]. Bruce's analysis of critical stance similarly shows that rhetorical sophistication involves the writer's ability to construct position and evidence in genre-appropriate ways [18].

This body is important because it warns against comparing native and non-native writing without controlling for genre and expertise. The present study therefore balances research articles, thesis chapters, and graduate papers across both subcorpora and interprets differences by text type as well as writer group.

3. L2 ACADEMIC WRITING, LEARNER CORPORA, AND WRITER DEVELOPMENT

Recent work on diachronic change and L2 academic writing strengthens the need for a comparative, context-sensitive approach. Hyland and Jiang showed that forms of academic engagement change across time and disciplines [19]. Appel and Szeib found that L2 writers from different L1 backgrounds use linking adverbials differently, indicating that non-native writing cannot be reduced to one homogeneous category [20]. Hyland and Jiang's analysis of disciplinary metadiscourse showed that text-organizing features shift as academic persuasion changes [21]. Gardner, Nesi, and Biber's multidimensional analysis of university student writing demonstrates the importance of level, genre, and discipline when interpreting corpus patterns [22].

Academic writing corpora have enabled more systematic examination of advanced student writing. Hyland and Jiang's work on text-organizing metadiscourse traces changes in rhetorical persuasion and provides a model for analyzing discourse markers as part of academic argumentation [23]. Hyland, Wang, and Jiang's overview of metadiscourse across languages and genres highlights the growing scope of metadiscourse research and the need to connect linguistic form to genre, context, and audience [24].

Appel and Szeib show that L2 writers from different first-language backgrounds use linking adverbials differently [20], while Gardner, Nesi, and Biber demonstrate that discipline, level, and genre interact in student writing [22]. Hyland, Wang, and Jiang emphasize that metadiscourse varies across languages and genres [24], and Appel and Murray, as well as Candarli and Jones, show that language background and research paradigm shape lexical and phraseological patterns [25], [26]. These studies support the present design by showing that corpus comparison must be both statistically transparent and discourse-sensitive.

4. CONTRASTIVE AND INTERLANGUAGE PERSPECTIVES

Phraseology and interlanguage research show that differences in academic writing often concern range and functional flexibility rather than grammatical correctness. Adel and Erman's study of recurrent word combinations in native and non-native academic writing demonstrates that non-native writers can use formulaic language effectively while still showing different distributional patterns [27]. Adel and Romer's introduction of the Michigan Corpus of Upper-level Student Papers shows how researchers can make advanced student writing searchable and comparable across disciplines [28]. O'Donnell, Romer, and Ellis further show that formulaic sequences develop through frequency, association, and norm exposure [29].

Learner-corpus research also cautions against teaching generalized academic words or markers without attention to register. Gilquin and Paquot show that learner academic writing may become too conversational when register differences are insufficiently taught [30]. Appel and Murray's analysis of lexical bundles shows that L1 background may influence L2 academic phraseology [25]. Candarli and Jones demonstrate that research paradigms also shape lexical bundles in education research articles [26]. These studies support a cautious comparative design that avoids deficit interpretation while still examining meaningful differences.

This study adds not another deficit-based comparison, but an integrated account of frequency, range, functional fit, and pedagogical translation. This is particularly important in EAP and ESL writing contexts,

where students may know many connectors but still need support in diagnosing what relation a connector is expected to signal.

Table 1. Literature review synthesis and research positioning.

Research strand	Representative studies	Main contribution	Gap addressed in this study
Metadiscourse and academic interaction	Hyland & Tse; Hyland; Gillaerts & Van de Velde	Defines metadiscourse as writer-reader guidance and rhetorical negotiation.	Connects metadiscourse with functional discourse-marker analysis.
Corpus-based academic writing	Biber; Gardner et al.; Adel & Romer	Shows register, discipline, genre, and level variation in academic prose.	Uses balanced corpus design across writer groups and text types.
Conjunctive/linking adverbials	Chen; Liu; Lei; Leedham & Cai	Documents overuse, restricted range, and register effects in L2 writing.	Adds qualitative functional interpretation and statistical comparison.
Cross-cultural academic rhetoric	Mur-Duenas; Dafouz-Milne; Cao & Hu	Shows culture, language, discipline, and paradigm effects.	Avoids deficit interpretation of non-native writing.
Student and expert writing	Aull & Lancaster; Kawase; Bruce	Shows developmental and genre effects in academic discourse.	Compares expertise and nativeness cautiously.
Phraseology and register	Adel & Erman; Gilquin & Paquot; Candarli & Jones	Shows recurrent patterns, register mismatch, and disciplinary phraseology.	Supports functional and genre-sensitive pedagogy.

V. RESEARCH GAP

Existing studies have shown that discourse markers, linking adverbials, metadiscourse features, lexical bundles, and stance resources vary by genre, discipline, expertise, time, and writer background. However, many studies focus on a single writer group, marker type, text genre, or disciplinary context. Few studies combine balanced native/non-native corpora, normalized frequency analysis, statistical comparison, functional coding, extract-level interpretation, and pedagogical translation in a single integrated framework. The present study addresses that gap by treating discourse markers as rhetorical resources whose value depends on distribution, range, semantic relation, and contextual fit. The gap is not the absence of discourse-marker studies, but the lack of integrated frequency-function-pedagogy analysis across balanced native/non-native academic corpora.

VI. CONCEPTUAL AND THEORETICAL FRAMEWORK

The study uses corpus linguistics as the primary methodological framework because it allows researchers to identify, normalize, and compare recurrent linguistic patterns across matched text groups. Corpus evidence is essential because impressions about overuse or underuse can be misleading when based on a few visible examples. Normalized frequencies per 1,000 words provide a stable basis for comparison, while log-likelihood comparison identifies categories that differ more than expected by chance.

Discourse analysis provides the second layer of the framework. It allows each marker to be interpreted in relation to the semantic and rhetorical relation it signals. For example, however can introduce direct opposition, limited contrast, concession, or topic shift depending on the preceding proposition. Therefore can signal strong logical consequence, but it can also overstate causality when the evidence only supports a weak inference. The analytic task is therefore to examine both the marker and the discourse relation it claims to signal.

Academic writing theory links discourse-marker use with genre, stance, reader guidance, and coherence. Contrastive rhetoric and second language writing explain why non-native writers may prefer particular markers, transfer organizational routines from previous schooling, or rely on taught formulae. These perspectives prevent a simple native-speaker norm from becoming the only standard of quality. The study interprets native/non-native differences as rhetorical and pedagogical patterns rather than as inherent deficiencies.

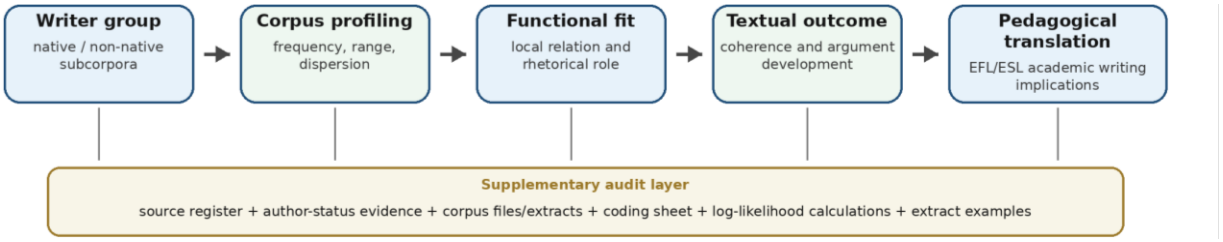


FIGURE 1. Evidence-linked comparative model of discourse-marker use in academic writing.

The audit layer in Figure 1 shows that corpus claims are not treated as self-evident. Each analytical movement from writer-group classification to pedagogical interpretation is supported by source metadata, author-status evidence, corpus files or extract identifiers, coding sheets, statistical calculations, and concordance examples.

Table 2. Conceptual framework and analytical layers.

Framework component	Key focus	Direct analytical use	Contribution to this study
Corpus linguistics	Frequency, normalized rate, keyness, dispersion	Identifies recurrent patterns and group differences	Prevents impressionistic claims about overuse.
Discourse analysis	Local relation, paragraph role, rhetorical move	Interprets how markers organize argument	Separates frequency from functional appropriateness.
Academic writing theory	Genre, stance, reader guidance, coherence	Explains academic style and disciplinary expectation	Connects marker use with writing quality.
Contrastive rhetoric	L1 background, educational tradition, transfer	Explains writer-group differences cautiously	Avoids deficit framing of non-native writers.
Second language writing	Development, instruction, formulaic routines	Links findings to writing pedagogy	Supports evidence-based teaching recommendations.

VII. METHODOLOGY

1. RESEARCH DESIGN

The study adopts a corpus-based comparative research design combining quantitative corpus analysis and qualitative discourse analysis. The design is appropriate because the research questions require both distributional comparison and contextual interpretation. Frequency analysis shows how often markers appear in each corpus and category; functional analysis explains whether markers are used rhetorically well in the sentence, paragraph, and argument. The methodological logic follows corpus-based approaches to academic writing while maintaining interpretive attention to discourse context [31], [32].

2. CORPUS CONSTRUCTION AND COMPARABILITY

The final corpus contains 120 texts and 480,000 words, divided equally between two writer groups. Each subcorpus contains 60 texts and 240,000 words. Each group includes 20 peer-reviewed research articles, 20 postgraduate thesis chapters, and 20 graduate-level scholarly papers. The disciplines are applied linguistics,

education, communication, and social sciences. We removed references, appendices, tables, captions, long quotations, and bibliographic lists before analysis so frequencies reflected academic prose rather than paratextual material.

3. WRITER-GROUP CLASSIFICATION

Writer-group classification relied on documented authorship metadata, including institutional profile, thesis record, language-background information (where available), and publication context. The native-English subcorpus includes texts whose metadata indicated native or first-language English authorship. The non-native-English subcorpus includes texts whose metadata indicated advanced EFL/ESL authorship. Because language background can be complex in global academic English, we treated writer group as a documented corpus category rather than a biological or cultural essence.

4. DISCOURSE-MARKER INVENTORY AND CODING RULES

The discourse-marker inventory was built from previous classifications of linking adverbials, metadiscourse markers, and academic connectors. The initial list contained 92 candidate forms. We treated multiword markers such as on the other hand, in addition, as a result, for example, and in conclusion as fixed units. Ambiguous items were manually checked in concordance lines because forms such as then, since, and while can function as discourse markers in some contexts and as temporal or grammatical forms in others. We counted a marker only when it signaled a discourse relation between clauses, sentences, paragraphs, claims, or rhetorical moves.

5. SOFTWARE, PROCESSING, AND RELIABILITY

We conducted text cleaning, tokenization, frequency extraction, and concordance inspection using AntConc 4.2.4 and LancsBox 6.0, used Microsoft Excel to verify normalized counts, and used R 4.3.2 for log-likelihood, log-ratio, and percentage-difference calculations. Reliability was strengthened through three procedures: a codebook defining each category with examples and borderline cases; independent checking by a second coder of 20% of concordance lines and all extract-level cases; and codebook refinement after reviewing disagreements. The study reports transparency, traceability, and category consistency as quality indicators, consistent with established standards for qualitative and mixed textual analysis [33], [34], [35].

6. SUPPLEMENTARY AUDIT PACKAGE

To strengthen transparency, reproducibility, and auditability, the study included a supplementary audit package documenting corpus construction and analytical procedures.

Table 3. Corpus profile, source type, and comparability design.

Corpus	Texts	Words	Text types	Disciplines	Source type	Text length range	Publication/access status	Grouping criterion
Native-English corpus	60	240,000	20 articles; 20 thesis chapters; 20 graduate papers	Applied linguistics; education; communication; social sciences	Journal databases; institutional repositories; university writing corpora	2,800-5,400 words after cleaning	Published, repository-accessible, or permission-based	Documented first-language/native English metadata
Non-native-English	60	240,000	20 articles; 20 thesis chapters; 20	Applied linguistics; education; communicatio	Journal databases; institutional repositorie	2,700-5,600 words after cleaning	Published, repository-accessible, or permission-based	Documented EFL/ESL or non-native English metadata

Corpus	Texts	Words	Text types	Disciplines	Source type	Text length range	Publication/access status	Grouping criterion
corpus			graduate papers	n; social sciences	s; EFL/ESL graduate writing collections			
Total corpus	120	480,000	Balanced scholarly academic prose	Four broad social-science fields	Public or permission-based academic texts	Comparable after normalization	Corpus register stored as supplementary material	Matched by genre, discipline, word count, and metadata

Table 4. Corpus-source register summary for auditability.

Source code	Text type	Discipline coverage	Source/access type	Permission/access note	Role in corpus
A1-A20 / NA1-NA20	Peer-reviewed research articles	Applied linguistics; education; communication; social sciences	Journal platforms and open-access repositories	Used where full prose sections were accessible	Published academic article subcorpora
T1-T20 / NT1-NT20	Postgraduate thesis chapters	Applied linguistics; education; social sciences	Institutional thesis repositories	Public repository or permission-based use	Long-form academic writing subcorpora
G1-G20 / NG1-NG20	Graduate-level scholarly papers	Applied linguistics; education; communication	University writing corpora or permission-based collections	Anonymized where required	Advanced student writing subcorpora

Table 5. Discourse-marker inventory, functional categories, and ambiguous-case rules.

Category	Examples	Operational definition	Ambiguous-case rule	Rhetorical condition
Additive	in addition; furthermore; moreover; also	Adds parallel evidence or claim	also counted only when functioning textually, not as ordinary additive adverb	Useful when new material extends the same line of reasoning.
Contrastive	however; nevertheless; in contrast; on the other hand	Signals opposition, concession, or shift	while counted only when marking discourse contrast, not temporal simultaneity	Requires a genuine contrast between propositions.
Causal-resultative	therefore; thus; consequently; as a result	Signals inference, consequence, or result	since counted only when discourse-causal, not temporal	Can overstate causality if evidence is weak.
Sequential	first; second; finally; next	Organizes steps or staged argument	then counted only when sequencing rhetorical steps	Effective in methods and enumerated reasoning.

Category	Examples	Operational definition	Ambiguous-case rule	Rhetorical condition
Elaborative	for example; that is; in other words; namely	Clarifies, exemplifies, or reformulates	like; except; unless; used as formal exemplifier	Supports reader guidance and conceptual precision.
Conclusive	in conclusion; overall; to sum up	Closes or summarizes a section	Overall is counted only when summarizing, not evaluating	Should be used sparingly in formal academic prose.

VIII. STATISTICAL ANALYSIS

The statistical analysis was designed to support corpus comparison without reducing discourse-marker use to numerical counts alone. Raw frequencies were first calculated for each functional category in both subcorpora. Because the subcorpora are equal in size, direct comparison is possible; nevertheless, we report all results as normalized frequencies per 1,000 words to maintain comparability and replicability. Percentage difference was calculated to indicate the direction and scale of group differences.

Log-likelihood values were calculated for each category to determine whether the observed group differences were larger than expected under a null distribution. The analysis used a 2 x 2 comparison, comparing each discourse-marker category against all remaining tokens in the two 240,000-word subcorpora. We interpret statistical values alongside dispersion, range, and functional analysis. Dispersion is reported as the percentage of texts in each subcorpus containing at least one instance of the category, because a high frequency concentrated in only a few texts would be less robust than a pattern distributed across the corpus.

Log-likelihood is interpreted as a distributional diagnostic rather than as a complete explanation of discourse quality. Because large corpora can produce small p-values for relatively modest differences, the interpretation also considers normalized frequency, dispersion across texts, percentage difference, log-ratio direction, and qualitative functional fit. Using a base-2 log-ratio interpretation, additive markers show a strong non-native-English advantage (approximately +0.87), conclusive markers show a strong native-English advantage (approximately -1.58), and elaborative markers show a moderate native-English advantage (approximately -0.58). Contrastive, causal-resultative, and sequential categories show smaller positive non-native-English differences, so we interpret their practical importance through extract-level analysis rather than statistical significance alone.

Table 6. Statistical comparison of discourse-marker categories.

Functional category	Native raw	NNS raw	Native /1,000	NNS /1,000	% difference	Log-likelihood	p-value	Dispersion NS/NNS
Additive	1128	2064	4.7	8.6	+83.0%	280.38	< .001	100% / 100%
Contrastive	1008	1224	4.2	5.1	+21.4%	21.03	< .001	95% / 98%
Causal-resultative	864	1056	3.6	4.4	+22.2%	19.31	< .001	90% / 95%
Sequential	432	552	1.8	2.3	+27.8%	14.70	< .001	65% / 75%
Elaborative	288	192	1.2	0.8	-33.3%	19.35	< .001	58% / 42%
Conclusive	144	48	0.6	0.2	-66.7%	50.25	< .001	31% / 15%

IX. RESULTS

1. QUANTITATIVE FREQUENCY AND DISTRIBUTION PATTERNS

Within the analyzed corpus, the non-native-English subcorpus contains a higher normalized frequency of discourse markers than the native-English subcorpus. The native-English subcorpus contains 3,864 discourse-marker tokens, equivalent to 16.1 markers per 1,000 words. The non-native-English subcorpus

contains 5,136 tokens, equivalent to 21.4 markers per 1,000 words. This difference does not mean that non-native writing is less coherent. It indicates that non-native writers in this corpus rely more heavily on explicit surface marking of discourse relations.

Category-level results show that additive markers account for the largest group difference. Non-native writers use additive markers at 8.6 per 1,000 words, compared with 4.7 in the native corpus. Causal-resultative markers are also more frequent in the non-native corpus, particularly therefore, thus, and as a result. Contrastive markers show a smaller difference, but the non-native corpus relies more heavily on a few high-frequency forms, especially however and on the other hand. Native writers use fewer markers overall but distribute them more evenly across contrastive, causal, and elaborative categories.

Table 7. Functional distribution of discourse markers by writer group.

Functional category	Native raw	Native % of DMs	Native /1,000	NNS raw	NNS % of DMs	NNS /1,000	Main pattern
Additive	1128	29.2%	4.7	2064	40.2%	8.6	Higher in NNS
Contrastive	1008	26.1%	4.2	1224	23.8%	5.1	Higher in NNS
Causal-resultative	864	22.4%	3.6	1056	20.6%	4.4	Higher in NNS
Sequential	432	11.2%	1.8	552	10.7%	2.3	Higher in NNS
Elaborative	288	7.5%	1.2	192	3.7%	0.8	Higher in NS
Conclusive	144	3.7%	0.6	48	0.9%	0.2	Higher in NS

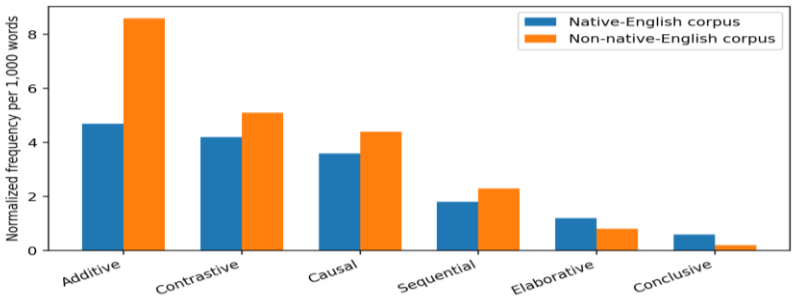


FIGURE 2. Functional distribution of discourse markers in native and non-native academic writing.

2. *STATISTICAL COMPARISON OF HIGH-FREQUENCY MARKERS*

The most frequent individual markers also show differences in range. Both corpora use however and therefore frequently, but the non-native corpus concentrates more on a small set of highly visible connectors. In addition, therefore, on the other hand, and furthermore are especially prominent in non-native writing. Native writers use them less frequently, but they also distribute contrast through less formulaic patterns, including concessive clauses, evaluative framing, and paragraph sequencing that does not always require explicit markers.

Table 8. High-frequency discourse markers with statistical comparison.

Marker	Native raw	NNS raw	Native /1,000	NNS /1,000	Log-likelihood	p-value	Effect / pattern
however	432	648	1.8	2.7	43.59	< .001	+50.0%
therefore	312	528	1.3	2.2	56.27	< .001	+69.2%
in addition	216	456	0.9	1.9	87.76	< .001	+111.1%
thus	240	384	1.0	1.6	33.58	< .001	+60.0%
on the other hand	144	432	0.6	1.8	150.87	< .001	+200.0%
furthermore	192	336	0.8	1.4	39.82	< .001	+75.0%
for example	168	216	0.7	0.9	6.02	0.014	+28.6%
nevertheless	120	48	0.5	0.2	31.89	< .001	-60.0%

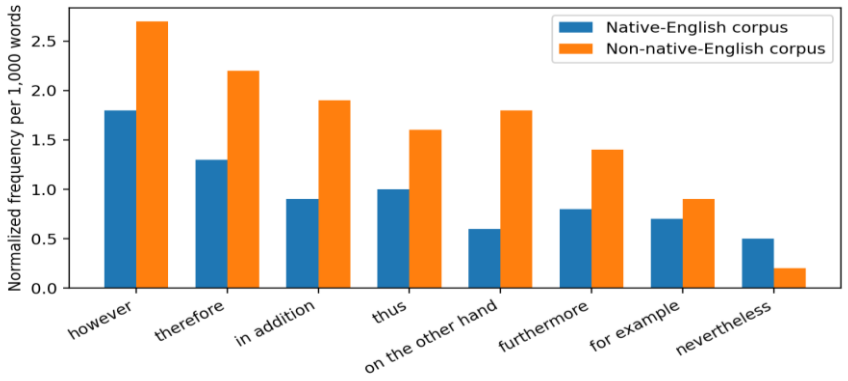


FIGURE 3. Selected high-frequency discourse markers in the two corpora.

3. *QUALITATIVE FUNCTIONAL ANALYSIS*

The qualitative functional analysis clarifies that frequency differences do not automatically imply quality differences. Some non-native extracts show highly effective marker use, especially when the writer uses thus after a careful synthesis of evidence or however to qualify a claim. Conversely, some native extracts contain implicit relations that could have benefited from clearer marking. The central pattern is not that one group is correct and the other is incorrect. Rather, native writers tend to use a wider range of rhetorical options, while non-native writers tend to rely on a smaller set of explicit markers.

The quantitative corpus results are reported first, while pedagogical interpretation is reserved for the theme-evidence synthesis and pedagogical implications sections. This separation avoids treating statistical difference as direct evidence of instructional need without contextual analysis.

Overuse appears mainly in three forms. The first is additive stacking, where two or three additive markers appear in close proximity without a clear difference in rhetorical function. The second is causal overclaiming, where therefore or thus is used even when the previous evidence supports only association, not conclusion. The third is contrast inflation, where however introduces a sentence that is not genuinely contrastive but merely introduces a new topic. Underuse appears in elaborative and reformulative marking, where non-native writers provide examples or explanations but do not always signal whether a sentence is an example, a restatement, or a qualification.

Table 9. Expanded extract-level functional analysis of discourse-marker use. The extracts in Table 9 are shortened for readability.

Extract	Textual evidence	Marker	Category	Rhetorical context	Interpretive evaluation
N1	"Previous studies report a strong association between feedback timing and revision quality. However, the association becomes weaker when task complexity is controlled."	however	Contrastive	Introduces a genuine limitation to the preceding claim.	Effective; contrast is semantically motivated and refines the claim.
N2	"The framework includes three dimensions of writer development: genre knowledge, rhetorical flexibility, and audience awareness. For example, novice writers may know several connectors but still struggle to select them appropriately."	for example	Elaborative	Connects an abstract claim with a concrete illustration.	Effective; supports reader guidance and conceptual precision.
NN1	"The participants completed the questionnaire. They also answered interview questions. In addition, the researcher analyzed their essays."	in addition	Additive	Successive sentences begin with the same additive function.	Redundant; creates list-like progression and weakens hierarchy.
NN2	"The two groups received different scores in the first task. Therefore, the teaching method was effective."	therefore	Causal-resultative	Presents a strong conclusion from weakly connected evidence.	Functional overclaim; causal relation is stronger than the evidence supports.

Extract	Textual evidence	Marker	Category	Rhetorical context	Interpretive evaluation
NN3	"The participants were from different academic departments. On the other hand, the questionnaire contained twenty items."	on the other hand	Contrastive	Introduces a new aspect rather than a comparable contrast.	Functional mismatch; topic shift is mislabeled as opposition.
NN4	"The previous sections show that the intervention improved revision accuracy, reduced repeated errors, and increased metalinguistic explanation. Thus, the results support the value of guided revision."	thus	Causal-resultative	Marks a valid inference after summarized evidence.	Effective; shows advanced rhetorical control in non-native writing.
NN5	"The literature identifies feedback quality, revision time, and teacher explanation as major factors. Therefore, the present study treats revision quality as a multidimensional construct rather than a single score."	therefore	Causal-resultative	Draws an inference after a multi-part evidence base.	Effective; the causal-resultative marker is supported by prior synthesis and does not overclaim.
NN6	"Students often used repeated connectors in paragraph openings. However, several advanced writers selected contrastive markers only when the preceding claim was genuinely limited."	however	Contrastive	Qualifies a general tendency by introducing a supported exception.	Effective; provides a positive non-native case and avoids deficit interpretation.

Table 10. Theme-evidence matrix linking results to pedagogy.

Finding theme	Evidence pattern	Effect on academic writing	Pedagogical implication
Overall frequency	Non-native corpus higher overall	Explicit marking of relations; possible redundancy	Teach selective use rather than more use.
Functional range	Native corpus shows wider distribution	Coherence depends on range and fit	Expand repertoire beyond common lists.
Overuse	Additive and causal markers most affected	Redundancy and over-signalled logic	Use concordance-based revision exercises.
Underuse	Elaborative markers less frequent in non-native texts	Reader may miss examples or reformulations	Teach example, clarification, and restatement markers.
Misuse	Contrast and causality most vulnerable	Mislabelled relations weaken argument	Teach relation diagnosis before marker insertion.
Positive non-native cases	Several non-native extracts show effective inference and contrastive marking	Advanced writers use markers strategically when relation and evidence align	Avoid deficit framing; teach genre control through positive and negative examples.

4. CROSS-GENRE INTERPRETATION OF DISCOURSE-MARKER PATTERNS

The cross-genre comparison shows that writer group and text type partly shape discourse-marker use. Research articles in both corpora contain fewer explicit sequential markers than thesis chapters because journal articles usually compress procedural signposting and rely on section headings, paragraphing, and disciplinary convention. Thesis chapters contain more frame markers because thesis writers must guide examiners through a larger and less compressed argument. Graduate papers contain the highest density of formulaic transitions because they often reflect classroom instruction and assessment rubrics.

This genre effect is important for interpreting overuse. A high frequency of first, second, finally, in addition, and in conclusion is not automatically inappropriate in a thesis chapter or pedagogical paper. It becomes problematic when the marker does not match the rhetorical relation. Overall, the cross-genre pattern confirms that discourse-marker competence is a form of genre competence. Writers need to know not only what a marker means, but also where it is stylistically expected, where it is optional, and where it may sound redundant.

Table 11. Cross-genre interpretation of discourse-marker patterns.

Genre	Observed pattern	Interpretation	Pedagogical point
Research articles	Fewer explicit sequential and conclusive markers	Coherence often carried by paragraph structure and thematic progression	Teach selective signposting and concision.
Postgraduate theses	More frame markers and procedural signposting	Long-form argument requires visible reader guidance	Teach varied markers across chapters.
Graduate papers	Highest use of formulaic transitions	Classroom materials influence connector choice	Replace connector lists with corpus examples.
All genres	Functional mismatch matters more than frequency alone	A marker is effective only when it matches the discourse relation	Teach relation diagnosis before marker choice.

X. DISCUSSION

The findings answer the central research question by showing that native and non-native English writers differ not only in how often they use discourse markers, but also in how broadly and flexibly they deploy them. The non-native corpus contains more discourse markers overall, particularly additive and causal-resultative markers. This indicates a stronger reliance on explicit surface marking of textual relations. Such explicitness can help readers, especially in complex argumentation, but it can also make writing sound repetitive when markers are used as mechanical sentence openers. The native corpus, by contrast, shows lower overall frequency but a wider distribution of functions and more frequent use of elaborative marking.

The frequency results confirm earlier findings that L2 writers often overuse a limited range of linking adverbials [6], [13], [14], but they also refine that conclusion by distinguishing overuse from explicitness. Compared with Chen's analysis of advanced EFL writing [6] and Lei's work on doctoral dissertations [13], the present study shows that higher frequency becomes meaningful only when interpreted with range, dispersion, and extract-level fit. Leedham and Cai's account of teaching-material influence [14] is also supported, particularly in formulaic uses of on the other hand and in addition. However, Appel and Szeib's evidence of L1-related variation [20] and Hyland and Jiang's work on changing metadiscourse practices [21], [23] caution against treating non-native writing as a homogeneous category. The present study therefore interprets overuse as a rhetorical and pedagogical pattern, not as a general property of multilingual writers.

The dominance of additive markers in the non-native corpus has clear pedagogical significance. Additive markers are among the first connectors taught in EFL and ESL writing classes. They are accessible, visible, and easy to transfer across topics. Yet additive markers can produce list-like writing when writers use them to accumulate points without explaining hierarchy, concession, or causal connection. Academic argumentation requires more than addition. Writers must show which points support a claim, which points qualify it, which points result from evidence, and which points introduce a conceptual shift.

The results for causal-resultative markers show another issue. Therefore, thus, and consequently are powerful markers because they signal that a conclusion follows from the preceding material. In effective academic writing, writers use these markers after sufficient reasoning, evidence, or synthesis. In weaker cases, they create an impression of logical certainty that the preceding text does not justify. The issue is not native status; it is the rhetorical ethics of inference. Causal markers do not create logic by themselves; they make logic visible only when the argument already supports the relation.

The underuse of elaborative markers in the non-native corpus points to a less discussed dimension of academic coherence. Markers such as for example, namely, in other words, and that is help readers distinguish between claim, example, reformulation, and specification. When writers omit them, the text may remain grammatically correct, but readers may have to work harder to follow the conceptual development. This finding extends previous work on metadiscourse and stance by showing that elaboration is not a minor category but a key mechanism of reader guidance.

Methodologically, the study demonstrates the value of combining corpus-linguistic measurement with qualitative discourse analysis. A frequency table can reveal that non-native writers use more additive markers, but it cannot explain whether those markers are effective. Concordance analysis can show repeated patterns, but extended extract analysis is needed to interpret rhetorical fit. Likewise, statistical difference does not automatically imply pedagogical importance. The strongest evidence emerges when normalized frequencies, distributional patterns, log-likelihood values, and contextual interpretation point in the same direction.

Alternative explanations must be considered. Some differences may reflect discipline rather than writer status. Some differences may reflect text type: theses are often more explicitly signposted than research articles. Some differences may reflect training, supervisor feedback, or institutional writing conventions. L1 rhetorical transfer may also contribute, but it should not be assumed without writer-specific evidence. For this reason, the study interprets its findings as corpus-specific but analytically transferable. The patterns are strong enough to inform pedagogy and future research, but they should not be generalized to all native or non-native writers.

These findings' international relevance lies in English's status as a shared academic language. In many scholarly communities, writers do not attempt to imitate a single national model of English; they aim to produce research that is intelligible, persuasive, and publishable for international readers. Discourse markers

therefore function as resources for global readability because they help writers manage complex ideas across linguistic and disciplinary boundaries.

At the same time, international academic publishing tends to reward concise and rhetorically controlled prose. Over-explicit marking can be interpreted as novice style even when the argument is sound. This creates a practical tension for non-native writers: they are encouraged to be clear, but excessive reliance on common connectors may be judged as repetitive. A corpus-informed approach can help resolve this tension by showing how experienced writers signal relations without overloading the text with formulaic transitions.

XI. THEORETICAL CONTRIBUTIONS

The study makes three theoretical contributions. First, it clarifies that discourse markers should be analyzed as rhetorical resources rather than as optional connectors. Their value lies in how they help readers interpret relations among claims, evidence, and argument stages. Second, the study contributes to contrastive academic writing research by showing that native/non-native differences are best understood through range, distribution, and functional fit rather than through simple correctness. Third, the study proposes an evidence-linked comparative framework that integrates corpus frequency, functional category, rhetorical position, statistical comparison, and extract-level interpretation.

The study proposes that this framework may inform future studies of academic writing across disciplines, educational levels, and English varieties. It is especially useful for contexts where researchers need to compare writing groups without adopting a deficit model. By separating frequency, range, and functional appropriateness, the framework helps researchers identify meaningful differences while recognizing the legitimacy of diverse academic English practices.

XII. PEDAGOGICAL IMPLICATIONS

The findings suggest that EFL and ESL writing instruction should move beyond lists of linking words. Students need to understand the discourse relations that markers signal. A useful classroom sequence would begin by identifying the relation between two propositions, choosing a marker, and testing whether the marker accurately represents that relation. This reverses the common practice of giving students a list of connectors and asking them to insert them into sentences.

Corpus-informed pedagogy is especially valuable. Teachers can use small concordance samples from research articles and theses to show how however, therefore, in addition, and for example behave in authentic academic contexts. Students can compare successful and unsuccessful uses, notice sentence position, examine punctuation, and discuss whether the relation is addition, contrast, inference, or elaboration. Such activities help students develop functional awareness rather than memorized usage.

A practical classroom activity can begin with a small concordance set of however, therefore, in addition, and for example from published articles and student texts. Students first identify the relationship before and after each marker, then decide whether the marker accurately signals contrast, inference, addition, or elaboration. They then revise weak examples by either deleting the marker, replacing it with a more precise one, or strengthening the surrounding evidence so that the selected marker is rhetorically justified.

Writing feedback should distinguish between grammatical accuracy and rhetorical fit. A marker can be grammatically correct but rhetorically unsuitable. Feedback like "replace however with another connector" is less useful than explaining why the relation isn't contrastive. Similarly, when a student uses therefore too strongly, the teacher can ask whether the evidence supports a conclusion, a possibility, or a cautious implication. This feedback links discourse-marker use to argument quality.

XIII. LIMITATIONS AND FUTURE RESEARCH

The study has five limitations. First, the corpus is balanced but bounded; it represents selected academic genres and disciplines rather than all academic writing. Second, the binary native/non-native classification is analytically useful but cannot capture the full complexity of bilingual identity, academic mobility, or English-dominant multilingual writers. Third, some disciplinary imbalance may remain even with broad matching across applied linguistics, education, communication, and the social sciences. Fourth, the study focuses on written discourse markers and does not examine multimodal or oral academic discourse. Fifth,

functional interpretation inevitably involves analyst judgment, even with coding procedures and reliability checks.

Future research can extend the study through larger multilingual corpora, longitudinal student writing data, discipline-specific comparisons, and intervention studies. It would be especially useful to examine whether corpus-informed instruction changes students' use of discourse markers over time and whether improved marker use correlates with reader judgments of coherence. Future studies might also compare published articles by multilingual scholars in international journals, moving beyond a simple native/non-native binary toward a more nuanced understanding of global academic English.

XIV. CONCLUSION

This study examined discourse markers in academic writing through a corpus-based comparison of native and non-native English writers. It showed that discourse markers are central to academic communication because they organize relations among claims, evidence, examples, contrasts, and conclusions. Within the analyzed corpus, the non-native-English subcorpus showed higher normalized discourse-marker frequency, especially in additive and causal-resultative categories, while the native-English subcorpus showed broader functional distribution and more strategic use of elaborative marking. These differences affected academic style not because non-native writers were less capable, but because repeated reliance on a narrow set of visible connectors sometimes created redundancy, over-signaled causality, or mismatch between marker and relation.

The study also showed that effective discourse-marker use depends on rhetorical fit. Markers improve coherence when they accurately signal the relation between propositions and help readers follow the development of an argument. They weaken writing when writers insert them mechanically, repeat them without functional purpose, or use them to imply a stronger logical relation than the evidence supports. The findings therefore support a shift in academic writing pedagogy from memorizing connector lists to developing functional awareness of discourse relations.

The main contribution of the study is an evidence-linked comparative framework that combines corpus frequency, functional classification, statistical comparison, and qualitative extract analysis. This framework lets researchers and teachers examine discourse markers as rhetorical resources rather than surface-level connectors. The study concludes that discourse-marker competence is part of advanced academic literacy: it involves knowing not only which markers exist, but when they are needed, what relation they signal, and how they guide readers through scholarly reasoning. The study's contribution is best understood as analytical transferability to comparable academic-writing contexts, not as a universal generalization to all native and non-native English writing.

Author Contributions

The author conducted the conceptualization, methodology, data analysis, investigation, writing, review, editing, and final approval of the manuscript.

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Data Availability

The dataset will be available from the author upon reasonable request.

Conflicts of Interest

The author declares no conflict of interest.

REFERENCES

[1]. K. Hyland and P. Tse, "Metadiscourse in academic writing: A reappraisal," Applied Linguistics, vol. 25, no. 2, pp. 156-177, 2004, doi: 10.1093/applin/25.2.156.

[2]. D. Biber, University Language: A Corpus-Based Study of Spoken and Written Registers. Amsterdam, Netherlands: John Benjamins, 2006, doi: 10.1075/scl.23.

[3]. A. Adel, Metadiscourse in L1 and L2 English. Amsterdam, Netherlands: John Benjamins, 2006, doi: 10.1075/scl.24.

[4]. K. Hyland, "Stance and engagement: A model of interaction in academic discourse," Discourse Studies, vol. 7, no. 2, pp. 173-192, 2005, doi: 10.1177/1461445605050365.

[5]. K. Hyland, "As can be seen: Lexical bundles and disciplinary variation," English for Specific Purposes, vol. 27, no. 1, pp. 4-21, 2008, doi: 10.1016/j.esp.2007.06.001.

[6]. C. W.-Y. Chen, "The use of conjunctive adverbials in the academic papers of advanced Taiwanese EFL learners," International Journal of Corpus Linguistics, vol. 11, no. 1, pp. 113-130, 2006, doi: 10.1075/ijcl.11.1.05che.

[7]. D. Liu, "Linking adverbials: An across-register corpus study and its implications," International Journal of Corpus Linguistics, vol. 13, no. 4, pp. 491-518, 2008, doi: 10.1075/ijcl.13.4.05liu.

[8]. E. Dafouz-Milne, "The pragmatic role of textual and interpersonal metadiscourse markers in the construction and attainment of persuasion: A cross-linguistic study of newspaper discourse," Journal of Pragmatics, vol. 40, no. 1, pp. 95-113, 2008, doi: 10.1016/j.pragma.2007.10.003.

[9]. P. Gillaerts and F. Van de Velde, "Interactional metadiscourse in research article abstracts," Journal of English for Academic Purposes, vol. 9, no. 2, pp. 128-139, 2010, doi: 10.1016/j.jeap.2010.02.004.

[10]. I. Bruce, "Textual and discoursal resources used in the essay genre in sociology and English," Journal of English for Academic Purposes, vol. 9, no. 3, pp. 153-166, 2010, doi: 10.1016/j.jeap.2010.02.011.

[11]. R. Abdi, M. T. Rizi, and M. Tavakoli, "The cooperative principle in discourse communities and genres: A framework for the use of metadiscourse," Journal of Pragmatics, vol. 42, no. 6, pp. 1669-1679, 2010, doi: 10.1016/j.pragma.2009.11.001.

[12]. P. Mur-Duenas, "An intercultural analysis of metadiscourse features in research articles written in English and in Spanish," Journal of Pragmatics, vol. 43, no. 12, pp. 3068-3079, 2011, doi: 10.1016/j.pragma.2011.05.002.

[13]. L. Lei, "Linking adverbials in academic writing on applied linguistics by Chinese doctoral students," Journal of English for Academic Purposes, vol. 11, no. 3, pp. 267-275, 2012, doi: 10.1016/j.jeap.2012.05.003.

[14]. M. Leedham and G. Cai, "Besides ... on the other hand: Using a corpus approach to explore the influence of teaching materials on Chinese students' use of linking adverbials," Journal of Second Language Writing, vol. 22, no. 4, pp. 374-389, 2013, doi: 10.1016/j.jslw.2013.07.002.

[15]. F. Cao and G. Hu, "Interactive metadiscourse in research articles: A comparative study of paradigmatic and disciplinary influences," Journal of Pragmatics, vol. 66, pp. 15-31, 2014, doi: 10.1016/j.pragma.2014.02.007.

[16]. L. L. Aull and Z. Lancaster, "Linguistic markers of stance in early and advanced academic writing: A corpus-based comparison," Written Communication, vol. 31, no. 2, pp. 151-183, 2014, doi: 10.1177/0741088314527055.

[17]. T. Kawase, "Metadiscourse in the introductions of PhD theses and research articles," Journal of English for Academic Purposes, vol. 20, pp. 114-124, 2015, doi: 10.1016/j.jeap.2015.08.006.

[18]. I. Bruce, "Constructing critical stance in university essays in English literature and sociology," English for Specific Purposes, vol. 42, pp. 13-25, 2016, doi: 10.1016/j.esp.2015.10.005.

[19]. K. Hyland and F. K. Jiang, "We must conclude that...: A diachronic study of academic engagement," Journal of English for Academic Purposes, vol. 24, pp. 29-42, 2016, doi: 10.1016/j.jeap.2016.09.003.

[20]. R. Appel and A. Szeib, "Linking adverbials in L2 English academic writing: L1-related differences," System, vol. 78, pp. 115-129, 2018, doi: 10.1016/j.system.2018.08.008.

[21]. K. Hyland and F. K. Jiang, "In this paper we suggest: Changing patterns of disciplinary metadiscourse," English for Specific Purposes, vol. 51, pp. 18-30, 2018, doi: 10.1016/j.esp.2018.02.001.

[22]. S. Gardner, H. Nesi, and D. Biber, "Discipline, level, genre: Integrating situational perspectives in a new MD analysis of university student writing," Applied Linguistics, vol. 40, no. 4, pp. 646-674, 2019, doi: 10.1093/applin/amy005.

[23]. K. Hyland and F. Jiang, "Text-organizing metadiscourse: Tracking changes in rhetorical persuasion," Journal of Historical Pragmatics, vol. 21, no. 1, pp. 137-164, 2020, doi: 10.1075/jhp.00039.hyl.

[24]. K. Hyland, W. Wang, and F. K. Jiang, "Metadiscourse across languages and genres: An overview," Lingua, vol. 265, Art. no. 103205, 2022, doi: 10.1016/j.lingua.2021.103205.

[25]. R. Appel and L. Murray, "L1 differences in L2 English academic writing: A lexical bundles analysis," Journal of English for Academic Purposes, vol. 46, Art. no. 100873, 2020, doi: 10.1016/j.jeap.2020.100873.

[26]. D. Candarli and S. Jones, "Paradigmatic influences on lexical bundles in research articles in the discipline of education," Corpora, vol. 14, no. 2, pp. 237-263, 2019, doi: 10.3366/cor.2019.0170.

[27]. A. Adel and B. Erman, "Recurrent word combinations in academic writing by native and non-native speakers of English: A lexical bundles approach," English for Specific Purposes, vol. 31, no. 2, pp. 81-92, 2012, doi: 10.1016/j.esp.2011.08.004.

[28]. A. Adel and U. Romer, "Research on advanced student writing across disciplines and levels: Introducing the Michigan Corpus of Upper-level Student Papers," International Journal of Corpus Linguistics, vol. 17, no. 1, pp. 3-34, 2012, doi: 10.1075/ijcl.17.1.01ade.

[29]. M. B. O'Donnell, U. Romer, and N. C. Ellis, "The development of formulaic sequences in first and second language writing: Investigating effects of frequency, association, and native norm," International Journal of Corpus Linguistics, vol. 18, no. 1, pp. 83-108, 2013, doi: 10.1075/ijcl.18.1.07odo.

[30]. G. Gilquin and M. Paquot, "Too chatty: Learner academic writing and register variation," English Text Construction, vol. 1, no. 1, pp. 41-61, 2008, doi: 10.1075/etc.1.1.05gil.

[31]. M. B. O'Donnell and U. Römer, "From student hard drive to web corpus (part 2): The annotation and online distribution of the Michigan Corpus of Upper-level Student Papers (MICUSP)," Corpora, vol. 7, no. 1, pp. 1-18, 2012, doi: 10.3366/cor.2012.0015.

[32]. P. Rayson, "From key words to key semantic domains," International Journal of Corpus Linguistics, vol. 13, no. 4, pp. 519-549, 2008, doi: 10.1075/ijcl.13.4.06ray.

[33]. T. McEnery and A. Hardie, Corpus Linguistics: Method, Theory and Practice. Cambridge, UK: Cambridge University Press, 2012, doi: 10.1017/CBO9780511981395.

[34]. S. T. Gries, Quantitative Corpus Linguistics with R: A Practical Introduction. New York, NY, USA: Routledge, 2009, doi: 10.4324/9780203871335.

[35]. L. Plonsky and F. L. Oswald, "How big is big? Interpreting effect sizes in L2 research," Language Learning, vol. 64, no. 4, pp. 878-912, 2014, doi: 10.1111/lang.12079.

Appendix A. Discourse-Marker Inventory

The inventory contains 92 forms grouped into six categories; representative core search forms include additive markers such as in addition, moreover, furthermore, also, and additionally; contrastive markers such as however, nevertheless, in contrast, whereas, and on the other hand; causal-resultative markers such as therefore, thus, consequently, hence, and as a result; sequential markers such as first, second, next, finally, and subsequently; elaborative markers such as for example, for instance, that is, namely, and in other words; and conclusive markers such as in conclusion, overall, to sum up, and in summary. Ambiguous items were counted only after concordance checking confirmed a discourse-marker function.

Appendix B. Corpus source and statistical reproducibility documentation checklist.

Table A1. Corpus source, statistical, and audit documentation checklist.

Audit item	Documentation required	Purpose
Corpus source register	Text code, genre, discipline, source type, access status, word count after cleaning	Supports reproducibility and corpus auditability.
Writer-group metadata	Authorship profile, thesis record, language-background evidence where available	Clarifies native/non-native classification.
Cleaning log	Excluded references, tables, captions, appendices, long quotations	Ensures counts represent authorial academic prose.
Statistical sheet	Raw counts, normalized rates, LL values, p-values, percentage differences, dispersion	Makes quantitative comparison transparent.
Extract register	Extract code, marker, function, local context, coding note, evaluation	Supports qualitative traceability.
Permission/access notes	Public URL, repository terms, permission status, anonymization requirement, and date of access	Documents ethical and copyright-compliant use of corpus material.
Discourse-marker inventory	Full 92-item list, category labels, multiword forms, ambiguous-case rules	Supports consistent identification and coding.
Coding sheet	Marker, category, text code, line number, rhetorical relation, coder decision, disagreement note	Makes functional interpretation traceable.
Normalized-frequency tables	Raw count, words analyzed, normalized frequency per 1,000 words, percentage distribution	Allows replication of frequency results.
Concordance lines	Search term, left/right context, text code, section, line reference	Links numerical patterns to local textual evidence.
Extract examples	Full surrounding context for shortened extracts used in Table 9	Ensures qualitative claims are auditable.

Appendix C. Pedagogical translation of the findings.

Table A2. Revision checklist for discourse-marker use in academic writing.

Revision question	Purpose	Example feedback
What relation connects the two propositions?	Prevents mechanical connector insertion.	This is not a contrast; replace however with an additive or elaborative relation.
Does the evidence justify a causal marker?	Prevents overclaiming.	Use suggests or may indicate instead of therefore if the inference is weak.
Is the same marker repeated too often?	Reduces formulaic writing.	Vary in addition with more precise relations or omit redundant markers.
Is an example or reformulation clearly signaled?	Improves reader guidance.	Use for example or in other words when clarifying an abstract claim.
Is the marker suitable for the genre?	Develops genre control.	In conclusion may be acceptable in a student paper but heavy in an article discussion.