

A Sketch Engine-based Study on the Use of Conjunctive Adverbs in Academic Writing by Vocational Undergraduate Applied English Majors

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Abstract: To map writing logic through micro-level cohesive devices and serve curriculum development and assessment, this study focuses on Applied English students at a vocational undergraduate university in Guangdong. A self-built student academic writing corpus was constructed, with a sub-corpus of the British Academic Written English (BAWE) Corpus as a reference. The research addresses three core questions: Are there differences in frequency? Is there evidence of misuse, overuse, or underuse? How can teaching practices be improved? Using Sketch Engine, 14 conjunctive adverbs were retrieved. Normalized frequency counts (per 10,000 words) were used for Contrastive Interlanguage Analysis (CIA), supplemented by error analysis to conduct qualitative semantic and pragmatic evaluations. The results indicate that the four categories of conjunctive adverbs—causal, adversative, additive, and sequential—exhibit significantly lower overall frequencies among the students. The most pronounced gaps were found in the use of "and", "however", "so", and "then". Common errors include: mistaking coordination or trend for causality, confusing congruent relationships with adversative ones, mixing opposing logics within a single move, mismatched enumeration hierarchy and register, and the frequent use of conjunctive adverbs as "formatted signals" at the beginning of paragraphs. Based on these findings, the study proposes the following: Students should implement a concept-evidence-expression closed loop and engage in small-step rewriting. Teachers should adopt an explicitation-taskification-visualization approach to facilitate error example comparison, frequency benchmarking, and corpus-in-class practice.

1. Introduction

In accordance with the specific provisions of national official documents (e.g., the Degree Law) and the talent cultivation programs of higher education institutions, academic writing thinking and competence serve as a crucial criterion for determining whether undergraduates are eligible for graduation. This criterion is typically demonstrated through the completion of a qualified undergraduate thesis (or graduation project).

Since 2019, with the implementation and development of vocational undergraduate education, higher education in China has embraced new pathways and directions. Most vocational undergraduate institutions are private, and they are still in a phase of exploration through trial and error. These institutions also require students to complete a graduation thesis. However, students in private undergraduate institutions generally have inadequate foundational knowledge, which adversely affects their academic writing competence and proficiency. Therefore, questions such as the actual level of academic writing of graduates from private vocational undergraduate institutions, whether it meets the required standards for undergraduates, and whether it satisfies market demands, all remain to be explored and summarized.

In the process of academic writing, logical structuring ability is the cornerstone. Official figures, such as Wang Zhigang, Minister of Science and Technology, when discussing the logic of scientific and technological innovation, emphasized that rigorous logic is an inherent requirement for scientific research and high-quality papers. Scholars like Zhu Xudong and Guo Rong argue that

academic writing training focuses on five aspects: macro-logic, micro-logic, perspectives, arguments, and norms, among which logical structuring takes precedence. Thus, it is evident that logical structuring ability largely determines the success of academic writing.

Therefore, this study takes a vocational undergraduate institution in Guangdong as an example. It uses Sketch Engine to construct a corpus of students' graduation academic writings, and examines the use of conjunctive adverbs by vocational undergraduate English majors from a micro-perspective, so as to further understand the students' logical structuring ability.

2. Literature Review

2.1 Conjunctive Adverbs and Discourse Cohesion in Academic Writing

Discourse cohesion is a core indicator of the quality and logicity of academic writing. In classical discourse theory, Halliday and Hasan^[1] categorized discourse cohesive devices into five types: reference, substitution, ellipsis, lexical cohesion, and conjunction. Among these, "conjunction" encompasses various semantic connecting devices such as conjunctions and conjunctive adverbs, which express logical relationships between sentences or paragraphs. It mainly includes four categories: causal, adversative, additive, and sequential.

Subsequent studies have further confirmed that conjunctive adverbs perform dual functions of logical cohesion and semantic organization in academic writing^[2]. Proficient writers can flexibly select different cohesive devices based on the semantic relationships of the discourse, thereby maintaining the clarity of argumentative logic and textual coherence^[3]. It is evident that the appropriate use of conjunctive adverbs not only reflects grammatical competence but also indicates the writer's discourse awareness and logical thinking ability.

However, studies have found that the correct use of connectives remains a major challenge for English as a Foreign Language (EFL) learners. In EFL learners' writing, the mastery of connectives directly affects the overall cohesion and logical coherence of the text. Trebits^[4] pointed out that non-native speakers often struggle to achieve sufficient cohesion when writing academic texts, as negative transfer from their mother tongue limits their rhetorical choices. Meanwhile, El Gazzar^[5] found that students' writing generally suffers from weak cohesion, manifested as underuse of connectives, inappropriate use, excessive gaps in intra-sentence cohesion, and semantic ambiguity.

Students also frequently confuse different types of connecting devices. Particularly, when using conjunctive adverbs (e.g., however, moreover, therefore, thus, consequently, furthermore, unfortunately) in sentences, they often incorrectly use them in contexts where coordinating conjunctions (e.g., and, but, or, so) are required^[6]. This confusion reflects learners' limited understanding of the functions of logical cohesion and reveals the developmental bottlenecks of EFL students in language organization.

In summary, conjunctive adverbs are not only important means of achieving discourse cohesion but also key indicators for measuring learners' academic writing competence. Grammatically, they reflect the correctness of language combination; discursively, they mirror the writer's logical thinking and information organization abilities. Therefore, the analysis of conjunctive adverb use not only reveals the characteristics of learners' language use but also provides theoretical and empirical basis for understanding the discourse competence and writing development of EFL writers.

2.2 Learner Corpus Research on Conjunctive Adverbs

Learner Corpus Research (LCR) provides a crucial empirical foundation for exploring the actual language use of students in the process of second language acquisition^[7]. Through the method of Contrastive Interlanguage Analysis (CIA), researchers can systematically compare learner corpora with native speaker corpora to identify typical errors, overuse, and underuse in second language learning^[8].

Regarding conjunctive adverbs, numerous empirical studies have revealed significant differences between learners and native writers in terms of frequency of use, type distribution, and discourse

functions. For example, Mudhhi & Hussein^[9], in their comparison of academic writing between Kuwaiti EFL students and native speakers, found that learners tend to rely on a limited number of high-frequency conjunctive adverbs (e.g., because, so, then) and exhibit an unbalanced distribution across logical cohesion categories, with particular underuse in adversative and causal categories. Aziz and Nuri, in their corpus-based study of essays by Iraqi Kurdish undergraduate EFL students, discovered that students most frequently use sequential and additive conjunctive adverbs, while rarely using adversative and causal ones. Similarly, An and Xu^[10], in their corpus analysis of expository writing by Chinese EFL learners, indicated that students prefer conjunctive adverbs expressing superficial logical relationships (e.g., then, because, so) while neglecting those with more complex discourse functions (e.g., however, therefore, thus). Nan's^[11] corpus-based study further confirmed this trend: compared with native speaker corpora, Chinese college students show significantly higher frequencies in the use of enumerative, additive, and causal conjunctive adverbs, but lower frequencies in summative and concessive ones. Kao and Chen's^[12] cross-genre corpus study also noted that Chinese EFL writers tend to use single logical relationships in thesis writing, lacking diversity in discourse-level cohesion. It is thus clear that corpus analysis enables a deeper and clearer understanding of the linguistic characteristics of second language learners in academic writing, allowing for more accurate identification and summary of errors, and providing precise cases and materials for teaching.

2.3 Relevant Research on Chinese Vocational Colleges

Existing studies have yielded some findings regarding the writing of vocational college students. Through big data analysis of approximately 109,312 essays by vocational college students on "Pigaiwang" (an online writing correction platform), LIANG Lina^[13] pointed out that the overall writing proficiency of vocational college students is lower than that of undergraduate students, with a high error rate, particularly in spelling and collocation. Wen Yang^[14], in his measurement of writing strategies and writing competence among 308 students from Chinese vocational colleges, found that these students have weaknesses in structure and organization, and argumentation, and their application of writing strategies is also at a low level. Relevant studies indicate that writing strategies and organizational abilities in vocational colleges are factors closely related to cohesion, and underperforming students may not receive sufficient training in these aspects.

A search of relevant keywords on CNKI (China National Knowledge Infrastructure) shows that there have been very few studies specifically focusing on applied English writing in Chinese vocational colleges over the past decade. The only two existing studies^[15,16] discuss writing teaching for applied English majors in vocational colleges, but they do not specifically target academic writing and their research subjects are not at the vocational undergraduate level. In other words, there is a scarcity of research on the academic writing of applied English majors at the vocational undergraduate level. Meanwhile, there remains a lack of research focusing on the micro-level analysis of students' academic writing.

Based on the above literature and identified research gaps, this study constructs a self-built corpus of vocational undergraduate applied English majors to address the following research questions:

What are the differences in the frequency of key conjunctive adverbs used in academic writing between British students and Chinese vocational undergraduate applied English majors?

Do Chinese vocational undergraduate applied English majors exhibit errors, overuse, or underuse of conjunctive adverbs in their academic writing?

Based on these errors and pragmatic characteristics, what teaching implications can be drawn to strengthen the guidance on academic writing for vocational undergraduate applied English majors?

3. Theory and Methodology

3.1 Theory

3.1.1 Cohesion Theory

This study takes Halliday and Hasan's Cohesion Theory as its core theoretical support. The theory posits that the coherence of a text depends on semantic connections between sentences rather than merely grammatical cohesion. Halliday and Hasan categorize textual cohesion mechanisms into five types: reference, substitution, ellipsis, lexical cohesion, and conjunction. Among these, "logical cohesion" includes conjunctions, conjunctive adverbs, and other semantic linking devices, which express four types of logical relationships between sentences or paragraphs: causal, adversative, additive, and sequential.

In this study, Cohesion Theory serves to define the cohesive functions and semantic classification criteria of conjunctive adverbs. It enables the systematic classification and frequency counting of conjunctive adverbs in the academic writing of vocational undergraduate applied English majors, thereby identifying the students' usage tendencies and abnormal distributions across different logical categories.

3.1.2 Contrastive Interlanguage Analysis (CIA)

This study adopts Granger's CIA theory as the methodological foundation for Learner Corpus Research (LCR). As a core analytical framework for LCR, CIA reveals the systematic characteristics and error patterns of learners' language use by comparing learner corpora with native speaker corpora. According to Granger, contrastive corpus analysis is conducted at three levels: 1) Frequency level: Compare differences in the usage frequency of conjunctive adverbs between vocational undergraduate applied English majors and the reference corpus to identify overuse or underuse; 2) Collocation level: Examine unnatural collocations of conjunctive adverbs used by the students to reveal insufficient chunking ability; 3) Discourse function level: Analyze whether conjunctive adverbs are used in inappropriate discourse positions or semantic contexts by the students, so as to identify pragmatic or logical mismatches.

3.1.3 Error Analysis Theory

This study draws on Corder's and James' Error Analysis Theory as its supporting framework. Through systematic error identification, classification, and interpretation, this theory reveals learners' language internalization mechanisms, L1 transfer, and acquisition of target language rules.

Based on this theory, errors in the use of conjunctive adverbs in the academic writing of vocational undergraduate applied English majors are classified into four categories: (1) Formal errors (e.g., surface-level issues such as spelling, syntactic placement, and collocation structure); (2) Semantic errors (e.g., misselection of semantic relationships or logical markers); (3) Usage errors (e.g., issues related to frequency, style, register, and redundant use); (4) Pragmatic errors (e.g., cross-sentence logical incoherence, discourse disconnection, and discourse function mismatch).

Since the focus of this study is on conjunctive adverbs, a preliminary review of the observation corpus found no formal errors. Therefore, this study only analyzes three types of errors: semantic errors (misselection of logical markers), usage errors (issues with frequency, register, and redundancy), and pragmatic errors (cross-sentence logical mismatches and discourse function mismatches).

3.2 Research Methodology

3.2.1 Research Design

A corpus-based comparative approach is adopted, combining quantitative and qualitative analyses:

Quantitative analysis: Target lexical items are extracted via Sketch Engine, and the standardized frequency per 10,000 words ($NF = F/Texts \times 10,000$, where F is the occurrence frequency of the target conjunctive adverb and $Texts$ is the total number of characters in the corpus) is used to

compare differences between the self-built corpus and the reference corpus;

Qualitative analysis: Representative corpus examples are selected to analyze semantic, logical, and pragmatic errors.

3.2.2 Data Sources

Self-built corpus: The Vocational Applied English Bachelor Academic English Writing Corpus (VAEBAEWC) was constructed, containing 105 academic papers by vocational undergraduate applied English majors (35 papers each in language and culture, business, and translation), with a total of approximately 795,269 words and 966,799 characters.

Reference corpus: To compare academic writing differences between vocational undergraduate applied English majors and native English speakers, the "Linguistics + English" subcorpus of the British Academic Written English Corpus (BAWE) was selected as the reference corpus, with approximately 399,579 words and 478,036 characters.

All data were standardized to ensure fairness in frequency comparisons.

3.2.3 Research Variables

Based on Halliday et al.'s (1976) theory and studies on academic register by Biber et al. (1999) and Hyland (2005), conjunctive adverbs are classified into 4 categories (14 items in total) according to their logical functions:

Causal: therefore, thus, consequently, so (4 items);

Adversative: however, nevertheless, yet (3 items);

Additive: and, moreover, furthermore, besides (4 items);

Sequential: then, finally, next (3 items).

3.2.4 Research Procedures

Retrieve the 14 target conjunctive adverbs and calculate their standardized frequencies in VAEBAEWC and the BAWE subcorpus;

Compare the usage proportions of the four categories of conjunctive adverbs across the two corpora to identify overuse or underuse;

Select 2 error cases for each category of conjunctive adverbs to analyze their semantic and logical characteristics.

4. Analysis and Findings

4.1 Frequency Analysis of Conjunctive Adverbs

This study retrieved 14 conjunctive adverbs using the concordance function in Sketch Engine and calculated their standardized frequency per 10,000 words (NF) to compare usage differences between the self-built corpus (VAEBAEWC, 966,799 characters) and the reference corpus (BAWE subcorpus, 478,036 characters).

The results show that the usage frequencies of the four categories of conjunctive adverbs (causal, adversative, additive, sequential) in VAEBAEWC were significantly lower than those in the BAWE subcorpus, exhibiting a characteristic of "universal low frequency". Among these, the gaps for "and", "however", "so", and "then" were the most prominent: their NF values in VAEBAEWC were 358.85, 6.07, 11.38, and 2.81, respectively, while the corresponding values in the BAWE subcorpus were 4365.70, 256.61, 216.76, and 156.37, with NF differences of -4006.85, -250.54, -205.38, and -153.56, respectively.

From the perspective of CIA, this constitutes a typical case of underuse of conjunctive adverbs, directly leading to a lack of logical markers in the text: unclear causal chains easily result in "conclusion leaps"; insufficient adversative signals obscure the turning points of arguments; low frequency of additive adverbs leads to "isolated information"; and low frequency of sequential adverbs makes paragraph transitions stiff. Overall, the discourse logic relies on readers' semantic inference, which violates the core requirement of "explicit logic" in academic writing.

4.2 Analysis of Semantic Errors

Based on the analysis of VAEBAEWC, semantic errors are concentrated in "misjudgment of logical relationships", which can be specifically categorized into four types:

Misjudgment of causal relationships: Students often mistake coordinate or trending relationships for causal ones. For example, "therefore" is used to connect "poor quality of subtitle translation (current situation)" and "improving translation quality is a hot topic (field trend)", with no direct reasoning chain between the two; "consequently" is incorrectly used to link "low risk avoidance levels" and "social gender role perception" (two parallel cultural dimensions) into an artificial causal chain, resulting in a broken logical chain.

Misjudgment of adversative relationships: Students treat adversative adverbs as "sentence-initial signals" and ignore the requirement for semantic opposition. For instance, "however" is used to connect "insufficient persuasiveness of research" and "need for in-depth research" (semantically reinforcing information), causing logical contradictions; "nevertheless" is misused to continue the statement that "a product's sales volume increased but was surpassed by others" (semantic continuation), which is incorrectly regarded as an adversative relationship.

Misalignment of additive hierarchy: Overuse of "and" disrupts the binary symmetry of the "between...and..." structure (e.g., "culture and language and promote..."); or "moreover + but" is mixed in the same discourse move (conflict between progression and opposition), leading to confused information hierarchy; "furthermore" is mixed with enumerative adverbs such as "Secondly", disrupting the argument's hierarchical system.

Overuse of sequential adverbs: "Then" is treated as a "one-size-fits-all connector" and used in summary sentences with no temporal/procedural relationships (e.g., "Then summarise the cultural characteristics"), ignoring its original meaning of "temporal sequence". Only basic sequential adverbs such as "finally" and "next" showed no semantic errors, reflecting students' relatively better mastery of simple procedural logic.

4.3 Analysis of Pragmatic Errors

Pragmatic errors focus on "functional mismatch" and "stylistic imbalance", with the following core manifestations:

Functional mismatch of causal adverbs: Students mistakenly use causal adverbs (intended for "logical inference") as "discourse progression signals". For example, "consequently" is used to introduce research methods (e.g., "Consequently, an analysis of Shanghai Disneyland's IP marketing...") without fulfilling its inferential function; simultaneous use of "however + therefore" leads to conflicting cohesion directions and logical confusion.

Logical redundancy of adversative adverbs: Stacking of similar adversative markers (e.g., "however + on the contrary") weakens the clarity of rhetorical force; "nevertheless" is used to connect "popularization of smartphones" and "5G phones dominating the market" (semantically extending information), interrupting discourse coherence; mixing "yet" with "therefore" (conflict between adversative and causal relationships) ignores the logical consistency of the discourse.

Redundancy and misalignment of additive adverbs: Redundant collocations such as "and + also" and "Additionally + furthermore" make the discourse cumbersome; "furthermore" is misused in "result interpretation" contexts (e.g., "Furthermore, the implication is that...") and should be replaced with "thus" to correct the functional mismatch; "besides" overlaps with "also" (e.g., "Besides, strengthening English training, hotels should also...") and appears colloquial in research method descriptions, undermining the coherence of academic style.

Stylistic mismatch of sequential adverbs: "Then" is colloquial when used in the acknowledgment section (e.g., "Then I would like to thank..."), conflicting with the formal style of academic writing; in procedure descriptions (e.g., "Then summarise..."), it only serves as an "oral transition" without clear discourse function and should be revised to "Next, this study summarises..." to conform to written academic conventions.

4.4 Causes of Errors

Comprehensive analysis reveals three main causes of errors:

Weak foundational skills: Students have an inadequate grasp of the semantic boundaries, collocation rules, and discourse functions of conjunctive adverbs. They only mechanically imitate surface-level usage without understanding the logical conditions for appropriate use.

Teaching and technological factors: Vocational undergraduate courses focus on practical language expression, lacking training in academic discourse logic; some students over-rely on AI writing tools, abandoning independent logical construction and developing a tendency toward "cognitive laziness".

Inadequate learning attitude and knowledge transfer: Students lack awareness of continuous review and reflection, only addressing "surface-level error correction" for conjunctive adverb issues. They fail to develop systematic "semantic-pragmatic" cognition, making it difficult to transfer knowledge to academic writing scenarios.

5. Recommendations for Learning and Teaching Based on Findings

5.1 Recommendations for Learning

Based on the above findings at the frequency, semantic, and pragmatic levels, students should focus their improvements on the "concept-evidence-expression" loop:

First, at the concept level, students need to clarify the semantic premises and discourse function boundaries of the four categories of conjunctive adverbs to avoid misjudgment.

Second, at the evidence level, students should use Sketch Engine to establish a personal "conjunctive adverb error list" and conduct targeted reviews of high-frequency errors to ensure logical chains are directly inferable.

Third, at the expression level, students need to conduct "incremental rewriting" and "de-colloquialization" training: they should replace colloquial sentence-initial signals with explicit markers suitable for academic texts; meanwhile, they must maintain consistent logical direction within the same discourse move to avoid mixing progression and opposition.

Additionally, control reliance on machine translation and writing tools—limit their use to checking word forms and terminology rather than replacing logical organization. After each writing task, self-check the distribution and collocation of connective markers using a small-scale corpus to promote the transition from "knowing how to use words" to "knowing how to use logic".

5.2 Recommendations for Teaching

Teaching interventions should center on "explicitness, task-oriented approach, and visualization":

First, teachers should explicitly highlight the functional differences of conjunctive adverbs: they should use real error cases to create comparative microlectures, annotate the semantic conditions for each adverb, and demonstrate revision paths from "syntactically feasible" to "logically valid".

Second, teachers should design task-oriented training processes: from a CIA perspective, they should guide students to first conduct frequency benchmarking, then engage in closed-loop exercises of "error localization → function re-judgment → logical chain reconstruction → stylistic revision"; they should also set focused tasks to reduce students' cognitive load.

Third, teachers should visualize evaluation criteria: they should establish a concise coherence scale, anchoring scoring to the issues identified in this study to reduce vague feedback.

Finally, teachers should appropriately integrate discourse and thinking training into the curriculum: they should replace purely colloquial cohesion practice with small-scale corpus-in-class activities, and guide students to manually review AI-generated content after using technological tools—treating tools as means of evidence collection and self-check rather than substitutes for critical thinking in writing.

Through the above approaches, the three prominent issues ("insufficient frequency, functional misjudgment, and stylistic mismatch") can be transformed into actionable, assessable, and transferable teaching and learning objectives.

6. Conclusion

A comparison between the self-built VAEBAEWC and the BAWE subcorpus shows that vocational undergraduate applied English majors in China exhibit "universal low frequency" in the use of the four categories of conjunctive adverbs (causal, adversative, additive, sequential), with significant gaps between their usage of adverbs such as "and", "however", "so", and "then" and that of the reference corpus.

Qualitative analysis reveals common errors, including mistaking coordinate/trending relationships for causal ones, mistaking semantically extending information for adversative relationships, mixing contradictory logical markers within the same discourse move, and misaligning enumerative hierarchy with stylistic appropriateness. Pragmatically, conjunctive adverbs are often used as "formatted sentence-initial signals".

The main causes include weak linguistic and discourse foundations, insufficient logical thinking, inadequate genre-specific guidance, and over-reliance on technology. Corresponding recommendations focus on the "concept-evidence-expression" loop (for students) and "explicitness, task-oriented approach, and visualization" (for teachers): high-risk items are identified through frequency benchmarking and error case reconstruction; valid causality and sufficient opposition are strengthened; hierarchical and stylistic consistency is maintained; and actionable teaching interventions and assessments are implemented via corpus-in-class activities and coherence scales.

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