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Exploring Interactive Metadiscourse of Chinese Science Postgraduates' Academic English Writing

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Abstract

The present study aims to explore the employment of interactive metadiscourse in Chinese science postgraduates' academic thesis writing. Based on the interpersonal model of metadiscourse, this study analyzed the form, frequency and distribution of interactive metadiscourse, using thirty English abstracts of chemistry master's theses selected from China National Knowledge Infrastructure during the period of 2021-2023 as corpus. The results showed that among all interactive metadiscourse, transition markers appeared most frequently and were distributed widely; endophoric markers and evidentials occurred less frequently and were distributed sparsely; the transition marker "and" and the code gloss "( )" were overused and frame markers were underused. Therefore, academic writing instructors should pay attention to cultivating students' rhetorical awareness of using interactive metadiscourse in academic thesis writing to improve the organization of the abstract and make it more scientific. Through the above analysis, this research provides useful insights for academic writing in hard science, especially for improving the English academic writing skills of Chinese novice writers.

Keywords: interactive metadiscourse, thesis abstract, academic English writing, Chinese science postgraduates

1. Introduction

In the digital and intelligent age, the cross-cultural and cross-linguistic characteristics of academic exchanges are increasingly prominent, especially in science such as chemistry. As an important part of academic writing, the English abstract of chemistry master's thesis is not only an important window for academic communication, but also the key to display research results and attract the attention of the academic community. Therefore, the quality of the English abstract of the master's thesis in chemistry directly affects the international promotion of the research results. Metadiscourse, as a linguistic resource used in academic writing to organize texts and guide readers to understand, as well as show the author's position and argumentation process, plays an important role in improving the communicative effect of abstracts (Hyland, 2005; Ädel & Mauranen, 2010). In the context of cross-cultural academic exchanges, there may be differences in the use of metadiscourse in Chinese researchers' English abstracts (Liu et al., 2022), which may reflect the differences in academic expression habits, thinking patterns and writing traditions in different linguistic and cultural contexts.

However, the systematic research on the use of metadiscourse in the chemistry master's theses abstracts is not sufficient and it especially lacks in-depth analysis and understanding of the interactive metadiscourse in English abstracts. This study is filling the research gap by developing a self-built corpus of English abstracts of the master's theses in chemistry, analyzing the use of metadiscourse in the English abstracts, and revealing its differences and the cultural and disciplinary-specific factors behind it. This research will not only provide empirical foundation and guidance for academic writing in the field of chemistry and improve the cross-cultural academic communicative competence of chemistry researchers, but also have important significance for understanding cultural differences in cross-linguistic academic writing and promoting international academic cooperation.

This study focuses on the following two research questions.

(1) What are the forms, frequency and distribution of interactive metadiscourse in English abstracts of Chinese science postgraduates' chemistry master's theses?

(2) How does the analysis of employment of interactive metadiscourse affect academic writing instruction?

2. Literature Review

2.1 Metadiscourse Analysis

The concept of metadiscourse was invented by Zelling Harris in 1959. Throughout the development of metadiscourse, there has been continuous debate regarding its definition. Harris (1970) believed that it represents the attempts of a writer or speaker to guide the text perception of a receiver. Ädel and Mauranen (2010) suggested that the definitions of metadiscourse could be distinguished from broad and narrow perspectives respectively. The broad definition regards textual and interpersonal metafunctions as fundamental to metadiscourse, while the narrow definition views only textual metafunction as necessary and uses the term "metatext" rather than "metadiscourse". Hyland (2004) opined that metadiscourse was the linguistic resources used to organize the discourse or the writer's stance towards either its contents or the reader.

According to Hyland (2005), interpersonal model of metadiscourse can be divided into interactive metadiscourse and interactional metadiscourse, and the former is used to guide the reader through the text while the latter is used to involve the reader in the argument. Interactive metadiscourse can be further divided into "transitions", "frame markers", "endophoric markers", "evidentials" and "code glosses". "Transitions" are used to express semantic relation between main clauses. "Frame markers" refer to discourse acts. "Endophoric markers" refer to information in other parts of the text. "Evidentials" refer to information from other texts. Finally, "code glosses" are used to help readers grasp functions of ideational material. Table 1 shows the interactive metadiscourse of interpersonal model of metadiscourse with examples for each category.

Table 1. An interpersonal model of metadiscourse: interactive (Hyland 2005:49)

Category (Interactive)	Function (Help to guide the reader through the text)	Examples (Resources)
Transitions	express relations between main clauses	in addition; but; thus; and
Frame markers	refer to discourse acts, sequences or stages	finally; to conclude; my purpose is
Endophoric markers	refer to information in other parts of the texts	noted above; see Fig.; in section 2.5
Evidentials	refer to information from other texts	according to B; D states
Code glosses	elaborate propositional meanings	namely; e.g.; in other words

In *Metadiscourse in Academic Writing: A Reappraisal*, Hyland and Tse (2004) assessed the metadiscourse in 240 dissertations of six academic disciplines, namely, electronic engineering, computer science, business studies, biology, applied linguistics and public administration, and put forward some important principles and a more robust model of the concept based on the dissertations. Xu (2006) studied metadiscourse at a very early stage and focused on its definition, sphere of research, classification and problems in research concerning whether it should involve propositions, categorization, function, and so on. Ädel and Mauranen (2010) proposed that metadiscourse centered around "discourse about discourse" and conducted in-depth research on metadiscourse in academic language. Cava (2011) examined the recurring structural sets in abstracts of dissertations to combine corpus-based research method with manual analysis of the text. Cao and Hu (2014) conducted a comparative study of interactive metadiscourse in quantitative and qualitative research articles across three disciplines and revealed marked cross-paradigmatic and cross-disciplinary differences. Hyland and Jiang (2018) explored metadiscourse change in professional writing across disciplines over the past 50 years and found that there has been a significant increase in interactive metadiscourse and a significant decrease in interactional metadiscourse. Pearson and Abdollahzadeh (2023) attempted to take stock of the existing literature by investigating how metadiscourse had been researched in academic writing by analyzing a sample of 370 high-quality empirical studies published between 1990 and 2021. In addition, Jiang (2024) discussed the disciplinary and genre characteristic of academic English in terms of discourse rhetoric through literature and data and argued that academic English is a lexical and grammatical extension of General English.

2.2 Analysis on Journal and Thesis Abstracts

Concerning the metadiscourse analysis of journal abstracts and thesis abstracts, there are several studies such as Hu and Cao (2011), Li and Rij-Heyligers (2011), Akbas (2012), Kondowe (2014), Alotaibi (2015), Nugroho (2019), Zaki (2022) and Wang (2023), which conducted such research. Specifically, Li and Rij-Heyligers (2011) conducted a contrastive genre analysis of English abstracts of theses belonging to the same type, which showed the similarities between Chinese and foreign researchers in their writing of theses abstracts. In addition to certain similarities, Sun and Shi (2017) conducted a corpus-based comparative analysis of language categories between academic articles and undergraduate theses abstracts, and found that the comparison of language categories between academic articles in international journals and Chinese undergraduate theses abstracts had the following main differences: the structure and order of language categories, the use of the background and discussion move-step, and the use of the method and result move-step.

Recently, Miao (2023) enriched the empirical research by exploring English abstracts of journal articles in the fields of linguistics and economics in terms of macro-structural and micro-linguistic features based on genre analysis theory. Wang (2023) took the abstracts of international English academic journals with high impact factors as a reference to analyze and study the middle-length distribution, name materialization, grammatical metaphor and other technical indicators of English abstracts in Chinese journals, as well as the operation mechanism and organization function of these technical indicators. The results provided standards for the writing and translation of English abstracts of Chinese academic journals and solved the problem of uneven levels of writing and translation of Chinese abstracts in Chinese academic papers.

In short, many studies have been conducted on English abstracts of academic papers in different disciplines, but there are fewer reports in the field of chemistry. The analysis of the English abstracts of Chinese science postgraduates' chemistry master's theses in this article will be able to fill the gap in relevant research fields to improve the academic English writing of Chinese postgraduates in English as a Foreign Language (EFL) context.

3. Methodology

3.1 Research Design

This study focuses on thirty English abstracts of Chinese science postgraduates' chemistry master's theses in China National Knowledge Infrastructure during the period of 2021-2023. The sample size of thirty is considered adequate to conduct the relevant research and reach the saturation point for data analysis (Dörnyei & Griffee, 2007). The primary goal is to thoroughly examine the metadiscourse usage within these English theses abstracts in the science field, considering the cultural and academic traditions. Drawing on Hyland's (2005) metadiscourse model, the study employs quantitative and qualitative approaches to analyze the forms, frequency and distribution of interactive metadiscourse markers to enhance rhetorical awareness in academic writing for Chinese EFL novice writers.

3.2 Instruments

The analysis of metadiscourse was conducted using the software Antconc 4.2.4 and followed by manual retrieval and proofreading. Metadiscourse items investigated from *Metadiscourse: Exploring Interaction in Writing* (Hyland, 2005) were chosen as reference to help precisely identify and recognize the relevant metadiscourse in the selected corpus. After retrieval, careful analysis and proofreading, the forms, frequency, and distribution of interactive metadiscourse in the corpus were obtained.

3.3 Data Collection

The corpus in this study was chosen considering the following factors: accessibility, certain representativeness, and the reliability and validity of the corpus. The corpus consisted of thirty English abstracts from master's theses of Chinese science postgraduates majoring in chemistry from one prestigious university in China ranging from the recent three years. The corpus includes 13465 running words in total and the average length for each abstract is 449 words. All the selected abstracts were converted into word file format for further analysis and study.

3.4 Data Analysis

The linguistic data collected from the corpus was analyzed qualitatively and quantitatively, mainly concerning forms, frequency and distribution. First and foremost, Antconc 4.2.4 was used to count metadiscourse markers electronically which were in the word file format to derive the frequency for each type. Then, manual proofreading with two coders was adopted to ensure the validity and accuracy of the analysis. In addition, both coders have linguistic educational background and are familiar with coding and analysis.

4. Results and Discussion

4.1 Overall Analysis of Interactive Metadiscourse

In this section, the overall results of interactive metadiscourse in the theses abstracts in terms of the forms, frequency and distribution of interactive metadiscourse were reported after the statistical retrieval and manual proofreading (see Table 2). Among all interactive metadiscourse (870 cases), the number of "transitions" (697 cases) stands out significantly, having as high as 23.2 cases per abstract. Following closely behind is "code glosses" (102 cases), occurring at a rate of 3.4 cases per abstract. The remaining three metadiscourse categories show a notable low number of occurrences. Specifically, "frame markers" with 60 cases, "endophoric markers", nine cases, and "evidentials", two cases. From Table 2, we can also observe that "transitions" and "code glosses" are distributed almost in every abstract, which appear in 30 and 27 abstracts respectively. Following closely in terms of distribution are "frame markers", which appear in 21 abstracts. "Endophoric markers" and "evidentials" are scarcely distributed in the corpus. The former is distributed in five abstracts, while the latter is distributed in two abstracts. Next, we will conduct further analysis on these five forms of interactive metadiscourse.

Table 2. Overall results of interactive metadiscourse in theses abstracts

Forms	N	F	P	D
Transitions	697	23.2	80.1	30
Frame markers	60	2.0	7.0	21
Endophoric markers	9	0.3	1.0	5
Evidentials	2	0.1	0.2	2
Code glosses	102	3.4	11.7	27
Total	870	29.0	100	

Note:

N: numbers of occurrence

F: frequency per abstract

P: percentage (%) of interactive metadiscourse in each category

D: distributional number of the abstracts for each category

4.2 Specific Results for Each Type

4.2.1 Transitions

"Transitions" or "transition markers" are important components of interactive metadiscourse proposed by Hyland (2005). These markers are used to express additive, causative and contrastive relations in a thesis. According to the analysis, transition markers are the bulk of interactive metadiscourse because they can not only connect two propositions to express different logical relationships but also facilitate readers' better understanding of discourse.

In short, "transition markers" are the most frequently used interactive metadiscourse, which account for 80.1% in total. This indicates that the writers of the selected 30 thesis abstracts can correctly and appropriately use "transition markers" in their academic writing of thesis abstract. However, some issues have also emerged according to Table 3. The following are the demonstrations of variation on linguistic preference in different abstracts. Table 3 shows the top six frequently used "transition markers" in the corpus.

Table 3. Top six frequently used transition markers

	Transition markers	N	P
1	and	550	78.9
2	also	26	3.7
3	further	23	3.3
4	but	17	2.4
5	however	12	1.7
6	therefore	11	1.6
	Total	639	91.6

Note:

N: numbers of occurrence

P: percentage (%) of total transition markers

From the data in Table 3, we can draw some important results. Firstly, the "transition marker" "and" occupies more than half of all metadiscourse markers. On one hand, this indicates the preciseness between sentences in academic theses, namely, good coherence and consistency. On the other hand, the overuse of "and" also suggests a lack of variety in word choice and sentence structure among novice writers, expressing the need for further emphasis on relevant aspects in academic writing instruction.

A meticulous analysis of the metadiscourse in the selected abstracts reveals that "and" appears in almost every abstract, always ranking high in terms of its proportion of metadiscourse markers. For example, in abstracts 2, 6, 7, 23, and 24, the proportions of "and" among all metadiscourse markers are 33%, 46%, 32%, 29% and 20% respectively. This further emphasizes the prevalence of "and" as well as its associated "transition markers" in the corpus.

Secondly, other "transition markers" such as "also", "further" and "but" are also present in the selected corpus. Although their proportions among all "transition markers" are much lower than "and", which are 3.7%, 3.3% and 2.4% respectively, their linguistic functions are still clearly demonstrated.

Lastly, apart from the "transition markers" listed in the table, some other "transition markers" such as "so" (appearing ten times), "furthermore" (appearing six times), and "although" (appearing three times) are also included in the selected abstracts. However, their low occurrences once again indicate the weakness in the thesis writers' proficiency in word choice and sentence structure.

4.2.2 Frame Markers

According to Hyland's (2005) interpersonal model of metadiscourse, "frame markers" are used to express sequential orders and guide students through the discourse. Besides, "frame markers" can be further divided into four types: sequencing (in chapter X, finally, first...), label stages (at this stage, in conclusion, in summary...), announce goals (in this chapter, intend to, want to...) and shift topic (now, move on, well ...).

Based on the data in Table 2, "frame markers" appear a total of 60 cases in the selected abstracts, averaging 2.0 cases per abstract. Their proportion among all metadiscourse markers is 7.0%, ranking third among the five types of interactive metadiscourse. This indicates that most of the thesis writers are relatively proficient in using "frame markers" to enhance the structure of their thesis abstract and guide readers in understanding the discourse. However, for several abstracts, the use of frame markers remains insufficient.

We can get more information about "frame markers" with further study on their specific items. From the data on linguistic preferences for "frame markers" in Table 4 below, several important findings were obtained. First, "then" has the highest occurrence of usage, appearing 14 times in the corpus, accounting for 23.3% of all the "frame markers". On one hand, this suggests that the relevant writers consciously use "then" to efficiently and accurately convey structural relationships and sequences between discourse segments. This enables the abstract and even the entire thesis to be presented to readers in a clear and orderly manner. On the other hand, the overuse of "then" but rarely or not at all using "next", "subsequently" or other "frame markers" to express the same linguistic function also indicates a lack of diversity of vocabulary choice by novice writers who fail to persuade the potential readers.

Table 4. Top five frequently used frame markers

	Frame markers	N	P
1	then	14	23.3
2	first	12	20.0
3	so	10	16.7
4	well	9	15.0
5	finally	4	6.7
	Total	49	81.7

Note:

N: numbers of occurrence

P: percentage (%) of total frame markers

Secondly, the remaining four "frame markers" "first", "so", "well", and "finally" appear less frequently compared to "then". Each of them appears different times in the corpus, accounting for 20.0%, 16.7%, 15.0% and 6.7% in all the "frame markers" respectively. Among them, "first" and "finally" are used to express

sequence (start and end), while "so" is used to express causal relationships and shift of a topic. Typically, we can draw the research findings and results after "so".

Lastly, apart from those mentioned in the table, some other "frame markers" such as "listing (a, b, c, etc.)", "in stage X" and "in summary" are also included in the statistical results. They appear three times, twice and once in the corpus respectively. "Listing (a, b, c, etc.)" is primarily used for enumerating examples. It can be used as follows: *The frequent occurrence of the greenhouse effect is mainly due to deforestation, extensive use of fossil fuels, rapid population growth, etc.* For "In stage X", although not extensively distributed in the corpus, it is widely used in theses within the field of chemistry. Chemistry is an experimental-based discipline. Hence, many experimental processes will be described in the thesis. As a scientific discipline, its inherent strictness demands that the steps of chemical experiments must be clearly and orderly delineated. Therefore, "in stage X", representing reaction phases and steps, is widely used. "In summary" signifies a summary of the items which have been mentioned before. As abstract is a highly condensed section of a thesis, there is evidently little room for its presence. Therefore, other "frame markers" serving similar linguistic functions are distributed much less frequently in the corpus.

4.2.3 Endophoric Markers

In Hyland's (2005) interpersonal model of metadiscourse, "endophoric marker" refers to a type of interactive metadiscourse that directs the reader's attention to specific elements within the text itself. These markers function by referring backward or forward to elements within the discourse, such as referring to previous or subsequent sections, concepts, or chapters within the text. According to Table 2, "endophoric markers" have nine cases in the corpus, accounting for 1.0% of the total interactive metadiscourse markers.

The function of "endophoric markers" is to enhance the cohesion and coherence of the text by providing references to elements within the discourse itself, thereby helping the reader in understanding the connections between different parts of the text. They also serve to guide the reader through the text, highlighting important points, clarifying relationships between ideas, and reinforcing the overall structure of the discourse. The distribution of "endophoric markers" is demonstrated in Table 5 below.

Table 5. Distribution of endophoric markers in the corpus

	Endophoric markers	N	P
1	the above	4	44.5
2	in this chapter	2	22.2
3	the first two chapters	1	11.1
4	in the third chapter	1	11.1
5	the previous chapter	1	11.1
	Total	9	100

Note:

N: numbers of occurrence

P: percentage (%) of total endophoric markers

According to Table 5, firstly, "the above" (four cases in corpus) directs the reader to content located above the current position within the text. In Hyland's (2005) model, such marker contributes to cohesion by linking current content with previously discussed material. By reminding readers of relevant information, this marker facilitates comprehension and reinforces the relationship between ideas.

Secondly, "in this chapter" (two items in corpus) and "in the third chapter" (one item in corpus) serve to orient the reader within the discourse by referring to the current or one definite chapter, indicating that the discussion or findings are contained within certain chapter of the thesis. They also contribute to text organization and coherence by guiding readers to relevant sections of the thesis. By explicitly stating the location of the information, the marker facilitates navigation and comprehension for the reader.

Thirdly, "the previous chapter" (one item in corpus) and "the first two chapters" (one item in corpus) refer to preceding chapters, specifically the first X chapters of the thesis. Hyland (2005) suggests that such references facilitate in establishing connections between different parts of the text. By directing the reader's attention to earlier sections, this "endophoric marker" helps to reinforce continuity and logical progression within the thesis.

All in all, constrained by the length and nature or function of abstracts, the utilization of "endophoric markers" is indeed quite limited. However, even with several examples, we can still grasp their linguistic functions. By

adhering to Hyland's (2005) model of metadiscourse, writers can effectively employ these markers to enhance text coherence, organization, and reader understanding, thereby contributing to the overall quality and effectiveness of their academic discourse. It is hoped that through further analysis of the entire thesis, more examples of "endophoric markers" will be identified, thereby making a greater contribution to the academic writing instruction.

4.2.4 Evidentials

Unlike other interactive metadiscourse including "transition markers", "frame markers", "endophoric markers" and "code glosses", "evidentials" are a special type of metadiscourse characterized by their limited number and stable linguistic nature. According to Hyland (2005), "evidentials" are information or linguistic items from other sources. For example, "to cite X" and "according to X" and "[ref. no.] /[name]" are all typical "evidentials".

Regarding the function of "evidentials", it is used to represent viewpoints and opinions from other sources and assist writers in establishing connections between different sources, including their own. In academic writing, the function of "evidentials" is irreplaceable. If one cannot correctly and effectively cite viewpoints and ideas from others, then it is difficult to say the research is qualified. Quoting external viewpoints not only enhances the scientific and factual accuracy of the thesis but also demonstrates respect for the cited authors.

Based on Table 2, in the corpus, "evidentials" appear only twice, specifically in two items of "according to". Its proportion among all interactive metadiscourse is almost negligible. This seemingly unusual phenomenon has been observed in previous research. In *Metadiscourse in Chinese PhD Academic English Writing*, Wang (2020) proposed that the present study of "evidentials" were determined in considerably limited linguistic expressions. The most frequently observed "evidential" in academic writing is the use of "according to" (Hyland, 2005).

The reasons for the lowest frequency of "evidentials" in the corpus are twofold. On one hand, it is constrained by the length limit of abstracts. On the other hand, the primary function of an abstract leans towards introducing the main content of the study itself, rather than providing an overview of the existing research landscape, which should appear in a literature review. Although our corpus only includes the abstract section, teaching proper citation methods in academic thesis writing is undoubtedly of paramount importance not only in terms of content but also in structure.

4.2.5 Code Glosses

An important feature of interactive metadiscourse in terms of its linguistic function is that it can use a familiar or known linguistic item to explain and describe another. According to Hyland's (2005) model of metadiscourse, "code glosses" are explanatory annotations that clarify specific terms, abbreviations, symbols, or other specialized language used in academic writing. By offering clear definitions or explanations, "code glosses" help to alleviate reader confusion regarding certain terms, enabling them to better comprehend the intended meaning conveyed by the author. This usage is defined as "code glosses". According to Table 2, "code glosses" appeared a total of 102 times in the corpus, accounting for 11.7% of all interactive metadiscourse. Its frequency closely follows that of "transition markers", averaging 3.4 items per abstract.

Ädel and Mauranen (2010) proposed that the function of defining new terminologies is labeled as managing terminology. Considering that our corpus consists of scientific thesis abstracts, some new concepts, definitions, and terminology will frequently appear. Therefore, the widespread distribution of "code glosses" in corpus can be expected. Table 6 shows the top five frequently used "code glosses" in the corpus.

Table 6. Top five frequently used code glosses

	Code glosses	N	P
1	( )	73	71.6
2	or	10	9.8
3	such as	9	8.8
4	for example	4	3.9
5	that is	2	2.0
	Total	98	96.1

Note:

N: numbers of occurrence

P: percentage (%) of total code glosses

From Table 6, we can further clarify the linguistic preference of the thesis writers. Among the sub-categories of "code glosses", "( )" occupies a dominant position, appearing 73 times in the corpus and accounting for 71.6% of all "code glosses". "Or" and "such as" follow closely, appearing 10 times and nine times respectively, making up 9.8% and 8.8% of all "code glosses". Then it is "for example", serving similar linguistic functions as "such as", appearing four times collectively, accounting for 3.9%. Lastly, "that is" appears only twice, making up 2.0%. In the corpus, "( )" emerges as the most frequently used "code glosses", indicating its significance in academic thesis writing.

5. Findings, Suggestions and Limitations

5.1 Major Findings of the Present Study

Upon overall analysis, we found five forms of interactive metadiscourse and each one has its own markers. In terms of frequency, "transitions" are the most prevalent among the five forms of interactive metadiscourse followed by "code glosses", "frame markers", "endophoric markers" and "evidentials" which have much lower frequencies. In terms of the distribution, the ranking of the five forms of interactive metadiscourse still follows the above pattern. However, what differs is that although "frame markers" do not have a very high frequency, their distribution is extensive. They only account for 7.0% of the total interactive metadiscourse, but are distributed in 21 out of 30 abstracts. Here are the specific findings regarding the five forms of interactive metadiscourse.

Firstly, transition markers, such as "and", "also" and "further", are frequently used to establish logical connections between points. Furthermore, among them, "and" is the most widely used, which helps strengthen the logical and structural connections between sentences. However, the overuse of it also indicates a lack of variety in vocabulary and sentence structure among novice writers.

Secondly, "frame markers", including "then" and "first", are utilized to indicate sequential order and guide readers through the discourse. While "then" is commonly used, indicating good coherence of the discourse, its overuse also suggests a need for diversity in vocabulary choice. Some other "frame markers" have also been thoroughly analyzed.

Thirdly, "endophoric markers", like "the above" and "in this chapter", are used to refer to specific elements within the text. Their limited use in the corpus indicates a focus for abstract on summary or generalization rather than referencing internally. It can be expected that other significant findings will be obtained through further analysis on a larger corpus.

Fourthly, "evidentials", like "according to", is scarcely used in the corpus, mainly due to limitations of the abstracts. Their absence reflects the abstract's purpose of providing a brief overview rather than citing external sources extensively.

Lastly, "code glosses", including "( )", "or" and "such as", are predominantly used to clarify abbreviations and introduce examples in corpus. Their occurrence highlights the necessity of defining new terms and providing illustrative examples in scientific abstracts.

However, problems reflected by the analysis of interactive metadiscourse in academic thesis writing are as follows. First of all, the overuse of certain interactive metadiscourse markers in the abstracts should be noted, such as "and" as well as "( )". While their overuse may not lead to misunderstanding of the discourse content and meaning, it does not adhere to the norms of English writing. Besides, the underuse of "frame markers" should also be noted. Proper and appropriate use of "frame markers" can make the abstracts more orderly and scientific.

5.2 Suggestions

Based on the results of the present study, some suggestions are provided as follows. On one hand, the benefits of analyzing academic thesis abstracts from a metadiscourse perspective are obvious. This kind of analysis helps the writers better understand and utilize the structure and logic of language, making their theses clearer and more coherent. It also provides a theoretical foundation for practical thesis writing and instruction. While linguists play a crucial role in this field, it is true that anyone with relevant and basic knowledge and theory can conduct such analysis. By regularly engaging in this kind of analysis, writers can improve the quality of their theses because they gain a deeper understanding of how language is used and can apply this understanding to their own writing.

On the other hand, teachers should guide students to read more authoritative and international academic journal articles. These papers can serve as references to enhance the scientific and factual accuracy of their own theses and allow students to learn linguistic knowledge such as vocabulary selection and sentence structure. Such kind

of academic practice can be very helpful to improve novice writers' rhetorical awareness and can write concise thesis abstracts.

5.3 Limitations

The study has some shortcomings due to time, capacity and some other factors. First and foremost, although the 30 selected theses abstracts meet the saturation point for the present study, the sample size is still limited. For future study, we can expand the corpus with more samples in more science disciplines, so that the findings may indicate more variety and reliability.

Furthermore, this study only focuses on interactive metadiscourse, without delving into another type of metadiscourse, namely interactional metadiscourse. Combining two types of metadiscourse for analysis can make the research more scientific and comprehensive and may yield more meaningful results.

In conclusion, it is hoped that this study can draw academic writing instructors' attention to cultivate students' rhetorical awareness of using interactive metadiscourse in thesis writing. In the future, it is hoped that there will be more research on interactive and interactional metadiscourse in the abstracts of scientific theses. It is also hoped that related research will be more comprehensive and extensive.

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