A COMPARATIVE CORPUS-BASED STUDY OF NURSING AND LANGUAGE TEACHING RESEARCH ARTICLES: A MULTIDIMENSIONAL ANALYSIS

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A Dissertation Submitted in Partial
Fulfillment of the Requirements for the Degree of
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ABSTRACT

Title of Dissertation	A Comparative Corpus-based Study of Nursing and Language Teaching Research Articles: A Multidimensional Analysis
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This paper presents the results of multidimensional analyses investigating patterns of linguistic features in Nursing Research Article Corpus (NURAC) and Language Teaching Research Article Corpus (LTRAC). The findings showed the nursing research articles contained four stylistic patterns and communicative functions. They are Evaluative Stance Focused, Established Knowledge Focused, Claim Focused, and Intention Focused. The language teaching research articles contained six stylistic patterns and communicative functions. They are Persuasion Focused, Evaluative Stance Focused, Claim Focused, Established Knowledge versus Past Action Focused, Ownership Focused, and Modified Information Focused. An intersectional comparison within NURAC and within LTRAC indicated that each pattern was found in different research article's conventional sections. An interdisciplinary comparison indicated that three out of the four dimensions in NURAC were also found in LTRAC. Herewith, the findings argue that the professional research article writers employ several stylistic patterns for writing each research article's conventional section. The use of these patterns depends primarily on the functional properties and the textual variation. A possible reason why some stylistic patterns used in NURAC slightly differ from LTRAC might presumably be due to differences of their writings natures. In the researcher's opinion, the findings from this dissertation could be beneficial to ESP / EAP course and curriculum designers, teachers of English language in academic writing courses, non-native

English and novice researchers and students particularly from these two disciplines for the application of this knowledge to improve their academic writing skills.

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CHAPTER 1

INTRODUCTION

English is widely used as a major language for research writing (Grabe & Kaplan, 1997; Hyland, 2012; Kaplan & Baldauf, 2005). However, not all researchers (especially non-native English and novice researchers) can use English efficiently for this purpose (Cho, 2004; Flowerdew, 1999). When competing with experienced native English researchers for publication, the non-native English and novice researchers are at a distinct disadvantage (Burrough-Boenisch, 2003). They sometimes feel marginalized from the international academic community. This might be owing to reasons for example i) writing the research article is linguistically, culturally, and disciplinary specific (Swales, 2004) and / or ii) some researchers might not be familiar with the lexical, grammatical, syntactical, semantic, and pragmatic conventions regarding a research article (Kaplan & Baldauf, 2005).

As in many other countries, several researchers in Thailand, where English is considered a foreign language, are also facing this problem. Presently, Thai researchers, teachers, and graduate students are encouraged to carry out research studies and need to have these published in international journals. However, writing the research article may be beyond their abilities. According to Kaplan and Baldauf (2005), to rectify this problem, researchers should learn the lexico-grammatical patterns associated with it.

Over the past decades, many genre analysts have been interested in studying research articles. Swales (1992) investigated research articles and proposed the Create a Research Space (CARS) model. Many genre studies applied Swale's (1981) CARS model to examine rhetorical moves in research article conventional sections from various disciplines. These include Dudley-Evans' (1998), Hirano's (2009), Loi and Evans' (2010), Samraj's (2002), Sheldon's (2011), and Swales and Najjar's (1987) investigation of rhetorical moves in the Introduction; Lim's (2006) and Peacock's (2011) studies of moves in the Method; Bruce's (2009), Lim's (2010), and William's

(1999) explorations of moves in the Results; and Dudley-Evans' (1998) and Peacock's (2002) studies of moves in the Discussion. Beside those four main conventional sections, the Abstract has received some attention as well (e.g. Kanoksilpatham, 2009; Martin-martin, 2003; Pho, 2008).

While Swalesian studies have leaned toward investigating rhetorical moves, some studies have attempted to investigate lexico-grammatical features in research articles. These were arranged by a corpus linguistic technique. While a rhetorical move analysis explores the communicative purposes expressed by rhetorical moves, a corpus linguistic technique depends on frequency counts of lexico-grammatical features to describe their specific communicative functions. Lexico-grammatical feature studies have shown advantages of a combination between a genre analysis and a corpus linguistic technique. Studies of lexico-grammatical features in research articles can be characterized by two major focuses: phraseology and metadiscourse. The studies of phraseology have investigated collocations and lexical bundles (Cortes, 2004; 2008; Gledhil, 2000; Hyland, 2008) while the studies of metadiscourse have tried to understand how researchers organizes their arguments, presents themselves, and their attitudes toward readers (Abdollahzadeh, 2011, 2012; Hyland, 1994, 1998, 1999, 2001, 2002a, 2002b, 2004a, 2004b, 2004c, 2006). However, most early lexico-grammatical feature studies concentrated only on one specific feature, like active voice (Rodman, 1994), and personal pronouns (Kuo, 1999).

In addition, others have attempted investigations of the use of sets of lexico-grammatical features in research articles. For instance, Swales (2004) investigated the communicative functions of five lexico-grammatical features (hedging, past tense, present tense, passive voice, and that verb complement) in the Discussion of research articles. Biber and Finegan (1994) investigated co-occurrence of lexico-grammatical features in the Introduction and analyzed their micro-purpose. With no complete studies of inter-sectional variation, Kanoksilpatham (2003) was the first to employ a multidimensional technique in a study of sixty biochemistry research articles and examined the co-occurrence of forty-one lexico-grammatical features and how they occurred in various patterns to function communicatively in four research article conventional sections. Getkham (2010) also employed a multidimensional technique to investigate thirty-eight lexico-grammatical features and compared the features'

application across the four conventional sections of sixty applied linguistics research articles. Baoya (2015) explored co-occurring patterns of forty-four lexico-grammatical features in the four conventional sections of one hundred and twenty educational research articles. The evidence shows that, in the research articles, lexico-grammatical features need not adhere to traditional grammar, but can have their own communicative functions depending on a context where the lexico-grammatical features occur. Also, when some lexico-grammatical features co-occur, they provide some shared specific communicative functions for writing the research articles (Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003; Kolln, 2009).

Arguably, studies in nursing and language teaching have been increasing, yet few of these research articles written by non-native English and novice researchers are known (Canagarajah, 1999; Kumaravadivelu, 2007; Seidlhofer, 2004), presumably due to non-native English and novice researchers' papers not being published and / or due to their lack of English proficiency. According to scholars (e.g. Flowerdew, 2001; Tingen, Burnett, Murchison, & Zhu, 2009), numerous linguistic errors can be found in research articles submitted by the non-native English and novice writers. Thus, an insight into linguistic patterns in research article genre would assist both non-native English and novice writers to develop their academic writing proficiency, reduce their linguistic mistakes, and finally be able publish their research articles in international journals.

Based on the assumption that linguistic conventions in nursing research articles are different from language teaching research articles and there have been relatively few studies (e.g. Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003) employing a corpus based multidimensional analysis to investigate lexico-grammatical features in research articles, this dissertation aims at employing Biber's (1995) multidimensional technique to analyze thirty research articles from top five international nursing journals and another thirty research articles from top five international language teaching journals, all of which represent two polarized academic disciplines. This research encompasses an interdisciplinary approach: an integration of English for Specific Purpose (ESP) approach, English for Academic Purpose (EAP) approach, and Multidimensionality Approach (M.A.) with genre analysis.

In conclusion, previous studies on research articles have enhanced understanding of research articles and language use in relation to the semantic units, realizing the communicative purposes. Nevertheless, certain knowledge gaps need to be addressed to benefit non-native English, as well as novice researchers, students, as well as the ESP/EAP practitioner. The major limitations of prior research range from the absence of intersectional and interdisciplinary comparison, to the narrowness of focus in analyses sets of lexico-grammatical features in the research articles. With this in consideration, this study attempted to clarify the gap, extend the knowledge edge, make a significant contribution to the knowledge base of the genre, and help linguistically disadvantaged researchers, teachers, and students (especially in these two disciplines) in the competition for international publication.

This chapter summarizes a comparative corpus-based study of lexico-grammatical features of nursing and language teaching research articles. Sections one, two and three outline the identification of the problem, purpose of the study, as well as state research questions respectively. Subsequently, Sections four, five, and six address the hypotheses, present the significance of the study, and explain operational definitions. Finally, Sections seven raise assumptions derives from the study.

1.1 Statement of the Problem

Publishing an article in a peer-reviewed journal is essential to academic research. A researcher cannot complete his research without having it published (Day & Gastel, 2012). Currently, English is developing a status of world academic lingua franca, (Mauranen, 2008), with it being used as a medium language for writing research articles. However, not all researchers have the potential to write in English proficiently, with numerous non-native English and novice researchers being intimidated by the prospect (Wu, 2011). Thailand is a non-native English speaking country where English is not the country's first or even the second language. Most Thai graduate students, teachers, and researchers (particularly at Suan Dusit University) are not eloquent in English. They said they are not proficient enough in English writing to write adequate research articles. In the researcher's own opinion, and in agreement with Kaplan and Baldauf's (2005), this might be because of their

unfamiliarity of linguistic patterns used in the research articles. Furthermore, academic writing is noone's first language, topic specific, and a skill not naturally acquired. It needs to be learned and practiced. Necessitating an empirical study on a comparative corpus-based study of nursing and language teaching research articles would help shed light on the hidden linguistic patterns and their communicative functions used for writing each research article's conventional section. Thus, the main goal of this paper has been to study and discuss several key co-occurring lexico-grammatical patterns in the research articles, particularly on the structure of IMRD (Introduction, Methods, Results, and Discussion), as the predominant format of the research articles. It is the objective of the researcher to benefit ESP/EAP teachers, non-native English and novice researchers, and students to understand the linguistic patterns used for writing research articles especially in each research article's conventional section.

1.2 Purposes of the Study

The purposes of this study are addressed as follows:

1) To elucidate the co-occurring patterns of lexico-grammatical features in the four research article conventional sections of nursing and language teaching research articles (NURAC and LTRAC);

2) To identify communicative functions of the co-occurring patterns of lexico-grammatical features;

3) To compare whether differences exist among the research article conventional sections in regard to the patterns used; and

4) To compare the differences between NURAC and LTRAC in regard to the co-occurring patterns of lexico-grammatical features.

1.3 Research Questions

Based on the above purposes, the following research questions are investigated:

1) What are the co-occurring patterns of lexico-grammatical features in Nursing Research Article Corpus (NURAC) and language Teaching Research Article Corpus (LTRAC)?

2) What is the communicative function of each pattern of co-occurring lexico-grammatical features in NURAC and LTRAC?

3) Are there any inter-sectional statistically significant differences in the pattern used within each NURAC and LTRAC?

4) If so, what are inter-disciplinary differences in the co-occurring patterns of lexico - grammatical features between NURAC and LTRAC?

1.4 Hypothesis

Based on the research questions mentioned in section 1.3, the hypothesis proposed is that there are inter-sectional significant differences in the patterns used within each NURAC and LTRAC.

1.5 Significance of the Study

This comparative corpus-based study of nursing and language teaching research articles can be beneficial to non-native English and novice researchers (especially in these two disciplines), ESP/EAP practitioners, as well as students in numerous ways. By discovering co-occurring patterns of lexico-grammatical features in all four conventional sections of nursing and language teaching research articles, this study provided insight into the genre, as the research articles in these two disciplines have been neglected by genre analysts. Non-native English and novice researchers (especially in these disciplines) would consider the comprehensive descriptions of lexico-grammatical features a useful tool for crafting effective and publishable research articles. Furthermore, detailed and comprehensive delineations

of the characteristics of a research article genre provide ESP/EAP practitioners with knowledge for curriculum development.

Successful application of qualitative functional analysis and quantitative multidimensional analysis in investigating intersectional and interdisciplinary linguistic variation in nursing and language teaching research articles provide empirical evidence of the advantages of the integration as previously employed in Baoya's (2015), Getkham's (2010), and Kanoksilpatham's (2003) studies. Since pivotal inter-sectional and inter-disciplinary differences were found in terms of co-occurring patterns of lexico-grammatical features, sectional and disciplinary identification, on the basis of communicative purpose, is validated by an underlying dimension of lexico-grammatical features that realize a communicative function of each research article conventional section of each discipline. The results from multidimensional analyses can confirm validity in comparison to numerous previous studies which have relied on subjective manual analysis.

The corpora themselves, serving as the primary sources for this study, are useful for future research and for ESP/EAP teaching. This study employed a macroscopic approach to investigating co-occurring patterns of lexico-grammatical features rather than individual features. Nevertheless, a more concentrated investigation could be conducted to examine individual lexico-grammatical features in the corpora. This microscopic study will enhance macroscopic studies by providing further insights into the language use of the nursing and language teaching research article genre (Biber, 1995). For pedagogical purposes, a 'tagger' (a program which generates a grammatically annotated version of the corpus or text) from these specialized corpora can be a valuable resource for students in several nursing-related and language teaching-related disciplines. For instance, students can infer the functions and meanings of words through these corpora, where these discovery type learning experiences can help motivate students when they approach the corpora with specific questions.

1.6 Definitions of Key Terms

Some terminologies, particularly appearing in this study are defined as follows. Most of the terms are pertinent to Biber's (1995) 'Variation across Speech and Writing'

1) 'Multidimensional Analysis' (M.A.) refers to a process that categorizes data into two or more categories. The data category is then called 'dimensions' or sometimes 'factors'. Each dimension consists of features with positive and/or negative loading factors. In this research, a Multi-dimensional Analysis is employed to categorize linguistic features found in sixty research articles from the two polarized disciplines (nursing and language teaching) into dimensions, where each dimension represents some co-occurring patterns of the lexico-grammatical features.

2) 'Lexico-grammatical features' refer to linguistic features defined by Biber (1995). In this paper, lexico-grammatical features include tenses, grammatical voices, suasive verbs, private verbs, public verbs, first pronouns, second pronouns, the pronoun 'It', demonstrative, hedging devices, wh-clauses and that clauses including using 'do' as a pro-verb, that-deletions, contractions, synthetic and analytic negation, emphatics, discourse markers, 'be' as a main verb, amplifiers, sentence relatives, possibility modals, final prepositions, type/token ratio, word length, nouns, attributive adjectives, prepositions, adverbs, time adverbials, place adverbials, nominalizations and infinitives;

3) 'Corpus' refers to a collection of sixty research articles from two different disciplines (nursing and language teaching);

4) 'Tagger' refers to an instant software that enables the author of this dissertation to tag or to search for specific words in the corpus. Apart from lexical searching, Tagger can provide parts of speech and lexico-grammatical features of each word occurring in the corpus. In this study, the word 'tagger' particularly refers to a Multidimensional Analysis Tagger (version 1.3) of Andrea Nini (2015).

5) 'Co-occurring pattern' or 'dimension' refers to when one lexico-grammatical feature is significantly statistically used with other lexico-grammatical features when writing research articles. Then, the lexico-grammatical features are

clustered together. This phenomenon is called a co-occurring pattern or dimension (Baoya, 2015; Biber, 1995; Getkham, 2010, Kanoksilpatham, 2003)

1.7 Assumption

The assumption underlying this study was that each lexico-grammatical feature used for writing research articles has its own communicative function. When several lexico-grammatical features co-occur in a pattern, they together provide one shared specific communicative function (Biber, 1995). A research article genre consists of a lot of academic disciplines. Each discipline has its own linguistic convention which differs from others (Swales, 2004; Swales & Feak, 2004). The researcher of this study assumes that lexico-grammatical patterns in writing nursing research article and language teaching research articles would be different.

This chapter identified the pedagogical needs of non-native English and novice researchers (particularly in the disciplines) as the research problem. Some major gaps in existing literature were presented, including incomplete generic and linguistic accounts of the research article genre and ignorance of nursing and language teaching research articles as an entire entity in previous studies. The general research problem was narrowed down to a specific need to investigate inter-sectional and inter-disciplinary linguistic variation of the research articles. Accordingly, the research objectives, questions, hypotheses, and significance were outlined. Also, the definitions of key terms in this study were provided. The next chapter will present an analytical review of theories and previous studies relevant to this study.

CHAPTER 2

LITERATURE REVIEW

Within this study on investigated co-occurring patterns of lexico-grammatical features in Nursing Research Article Corpus (NURAC) and Language Teaching Research Article Corpus (LTRAC), this chapter provides theoretical and empirical literature about a research article, its basic structure, a Biber's multidimensional analysis, lexico-grammatical features, and previous studies. There are four main sections in this chapter. Section one includes academic discourse and theoretical concepts of the research article. Section two concerns a multidimensional analysis and lexico-grammatical features with their previous studies. Section three summarizes the overview of literature.

Nursing and langauge teaching are two significant disciplines in the academic community (Dudley-Evans, 1998; Hutchinson & Waters, 1987; Johns & Dudley-Evans, 1991; Ledoux, 2002; Strevens, 1988). This is evident in the proliferation of their research studies (Freihat & Khalaf, 2012).

Sharing research finding is necessary, making a research study incomplete until it has been published (Day & Gastel, 2012). However, writing a publishable research article is not easy (Thyer, 2008), where organization and lexico-grammatical uses need to be understood for an adequate research article. Most research articles contain four basic IMRD conventional sections (Introduction, Methods, Results, and Discussion) each of which addresses a different communicative purpose (Swales, 2004). The Introduction aims to familiarize the readers with the rationale of the work. The researcher posits the work in a theoretical context, and explains the research goals. The Methods demonstrates utilized materials and procedures. The Results illustrates findings. The Discussion supports conclusions by comparing the results with established knowledge in the field. (Sollaci & Pereira, 2004).

Differing from the traditional grammar, in research articles lexico-grammatical features can provide distinct communicative functions (Baoya, 2015; Biber, 1998; Getkham, 2010; Kanoksilpatham, 2003; Kolln, 2009; Tarone et al., 1981). For instance, 'present simple' and 'present perfect' are used to review previous studies in the Introduction and to discuss findings in the Discussion. 'Past simple' is used to describe procedures and report results in the Methods and the Results (Gunawardena, 1989; Trimble & Trimble, 1982). 'Passive' structures provide expository purposes while 'active' structures provide argumentative purposes (Riley, 1991). For this reason the key co-occurring patterns of lexico-grammatical features in the four research article conventional sections and their communicative functions in the two disciplines were investigated.

In this study, Swales' IMRD (2004) as well as Cargil and O'Connor's Hourglass Models (2009) were utilized. This study further showed an extension of the application of a Biber's (1995) multidimensional analysis to characterize lexico-grammatical features in the four conventional sections of research articles. The IMRD and Hourglass models have provided the basic research article's conventional sections, each of which expresses a specific communicative purpose (Anderson & Maclean, 1997; Williams, 1999). An application of a multidimensional analysis provides an explanation of how research articles in both nursing and language teaching are constructed at the micro level of linguistic characteristics. Biber (1995) was the first who utilized a multidimensional analysis (MA) in his corpora (Baoya, 2015, Getkham, 2010, Kanoksilpatham, 2003). It is applied to identify co-occurring patterns of lexico-grammatical features in texts. Each pattern contains a set of lexico-grammatical features and can be interpreted according to its communicative function underlying. The MA is therefore more precise than the analysis of a single feature (Baoya, 2015, Biber, 1995; Getkham, 2010, Kanoksilpatham, 2003).

Although several studies have employed a multidimensional analysis to investigate written texts (e.g. Atkinson, 1999; Biber, 1995, 2002; Biber & Finegan, 1994; Conrad, 1996), relatively few studies attempted to investigate research articles. This can be observed with, Baoya (2015), who uncovered seven co-occurring patterns of lexico-grammatical features in one hundred and twenty educational research articles, Kanoksilpatham (2003), who disclosed five co-occurring patterns in sixty

biochemistry research articles, and Getkham (2010) who discovered six co-occurring patterns in sixty applied linguistic research articles. From Baoya's (2015), Getkham's (2010), Kanoksilpatham's (2003) studies, the multidimensional analysis is considered an inventive approach unveiling co-occurring patterns of lexico-grammatical features with the underlying communicative functions. Also, the three studies (Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003) were developed as a conceptual framework for this dissertation.

2.1 Academic Discourse

In this section, particular ideas were examined as proposed by numerous scholars regarding academic discourse (Hyland, 2004b, 2006, 2007, 2008; Porter, 1992).

2.1.1 What is Academic Discourse?

Academic discourse refers to language use existing in the academic world (Hyland, 2004b) with four main types, namely research discourses, instructional discourse, student discourse, and popular discourse. Research discourse is used by researchers to convey information and knowledge in research settings. Instructional discourse is used to teach school and university students. Student discourse is defined as discourse used by students. Popular discourse is used in science and journalism to convey academic knowledge and information to a wider audience. However, the role of academic discourse is not only for conveying knowledge and information, but also to shape social roles and relationships and to construct knowledge in schools and universities (Hyland, 2006). From Hyland's (2008) point of view, the research article is thus identified an 'academic discourse'.

2.1.2 Theoretical Concepts of Research Article and Its Conventional Structure

A research article is a paper written by a researcher to distribute his knowledge to the academic community (Costello, 1997). The research article presents facts or an outcome of a research study rather than a summary of existing literature. The

researcher goes through several steps to publish his findings, having to systematically compose the article and submit it to a journal. Then, the article is peer-reviewed, revised and sometimes re-written. Considering this long process, publishing an article seems prestigious for many researchers (Fisher et al., 2014). However, writing it is not a naturally acquired skill, but needs to be learned and practiced (Hyland, 2001). Researchers should be taught how to construct a research article and how to use language appropriately when writing so that they will be able to write a publishable research article (Browner, 1999; Dever & Frankel, 2001; Todorovic, 2003).

This study is based only on research articles not review articles, which would not present new data from fresh experimentation, but rather discuss and compare the findings of other researchers to advance thinking in the area of interest. One popular model to picture organization of the research article is an 'Hourglass Model' (Figure 2.1).

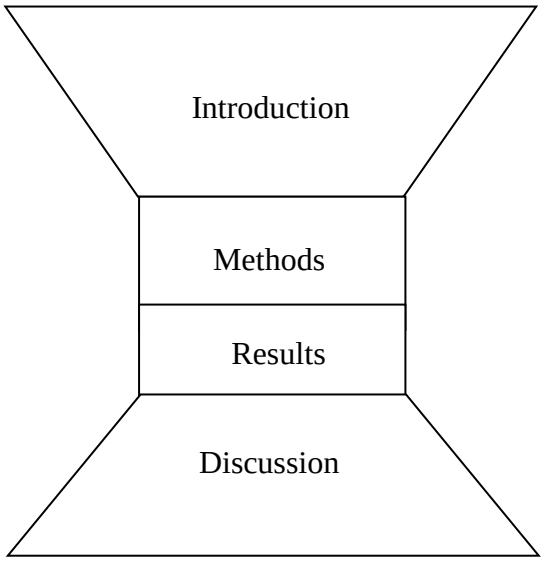

Figure 2.1 IMRD: The Hourglass Shape of a Generic Academic Research Article and Key Features

Source: Cargil & O'Connor, 2009.

Cargil and O'Connor (2009) developed Swales' IMRD (1990) model as an Hourglass model, diagramming a basic structure of most research articles, and is

widely used in numerous journals (Baoya, 2015; ElMalik & Nesi, 2008; Getkham, 2010; Kanoksilpatham, 2007, 2009; Li & Ge, 2009; Ngowu, 1997; Pho, 2008; Sollaci & Periera, 2004; Stoller & Robinson, 2013; Tessuto, 2015). The Introduction part of research articles leads the reader from a general subject area to a particular field of study. There are phases associated with this section. They are i) to highlight the importance of the topic, to make general statements about the topic, and / or to present an overview on current studies on the subject, ii) to identify a research niche by opposing an existing assumption, to reveal a gap in existing studies, to formulate a research question or problem, and / or to continue a disciplinary tradition, and iii) to place the study within the research niche by stating the intent, to outline the key characteristics, to describe important results, and to give a brief overview of the structure of the paper (Hirano, 2009; Redman, 2011; Samraj, 2002; Swales & Feak, 2004). The Methods introduces a methodological approach to investigate the research problem, indicates how the approach fits the research design, describes the methods of data collection, explains how to analyze the results, provides a justification for subject selection, and notates limitations (Azevedo, 2011; Butin, 2010; Carter, 2012; Lunenburg, 2008). The Results reports the findings without any interpretations (Brett, 1994; Burton, 2008; Kretchmer, 2003, 2008). The Discussion describes the significance of the findings in light of what is known and explains any new understanding about the problem (Annesley, 2010; Hess, 2004; Kretchmer, 2003, 2008; Sauaia, 2013; Schafer, 2009).

2.2 A Biber's Corpus-based Multidimensional Analysis and Lexico-grammatical Features

Due to the application of Biber's corpus-based multidimensional analysis to analyze co-occurring patterns of lexico-grammatical features in Nursing Research Article Corpus (NURAC) and Language Teaching Research Article Corpus (LTRAC) in this study, a Biber's corpus-based multidimensional analysis, lexico-grammatical features and their previous studies have been reviewed accordingly.

2.2.1 A Biber's Corpus-based Multidimensional Analysis

A multidimensional analysis (MA) is a corpus-based quantitative approach to analyze linguistic variation among registers or genres (Biber, 1995). Unlike grammatical analysis with focus on single lexico-grammatical features, the MA takes a multivariate approach to study sets of lexico-grammatical features in texts. The MA methodologically comprises many phases, namely developing a range of lexico-grammatical features for analysis, computing frequencies of the lexico-grammatical features in a corpus by a concordance program, normalizing them to allow comparison between texts of different sizes, and performing a factor analysis to identify 'dimensions'.

The dimension illustrated in the multidimensional analysis usually contains positive loadings and negative loadings features. The positive loading features are complimentary to the negative loading features, whereas the higher the frequency of the occurrence of lexico-grammatical features in one set, the lower the regularity of the features in the other set and vice versa. Each lexico-grammatical feature has its own loading indicating density of co-occurrence on each dimension. The more the feature's loading value, the more likely the feature is sharing the same function with its co-occurring features.

Subsequently, the dimension is correlative to the shared communicative functions of its composing lexico-grammatical features (Biber, 1995). For example, as observed in Biber's (1995) study of a 48-spoken-and-written-text-corpus, six dimensions were identified. Also, Past tense verbs, 3rd person pronouns, perfect aspect verbs, public verbs, synthetic negation, and present participial clauses simultaneously provide functions of 'Narrative versus Non-narrative Concerns' Notwithstanding, a dimension score is calculated by summing up the frequencies of lexico-grammatical features, each of which has notable loading on a pattern. This average dimension score facilitates a comparison of relations among texts and text varieties with respect to each pattern.

Numerous scholars (e.g. Atkinson, 1999; Baoya, 2015; Biber, 1995, 2002; Biber & Finegan, 1994; Getkham, 2010; Kanoksilpatham; 2003) agree that multidimensional analysis assists in providing a more comprehensive linguistic description of texts and text varieties.

2.2.1.1 Previous Studies on a Biber's Corpus-based Multidimensional Analysis to Investigate Written and Spoken Corpus

Biber (1995) employed the multidimensional analysis to investigate forty-eight lexico-grammatical features in his corpus originating from LOB (Lancaster-Oslo-Bergen) corpus and the LLC (London-Lund Corpus) corpus, representing several registers (e.g. radio broadcasts, press reportage, fiction, academic prose, letters, conversations, public speeches, interviews, etc.). In his study, five dimensions were revealed. Namely, I) Narrative and Non-narrative discourse; II) Involved and Informational Production; III) Non-impersonal and Impersonal Style; IV) Situation-dependent and Elaborated Reference; and V) Overt Expression of Persuasion.

Biber, Conrad, Reppen, Byrd, and Helt (2002) explored the T2K-SWAL (TOEFL 2000 Spoken and Written Academic Language) corpus by using the Biber's corpus-based multidimensional analysis to investigate forty-eight lexico-grammatical features, finding the same five dimensions as Biber (1995) found in his corpus. They were I) Involved versus Informational Production; II) Narrative versus Non-narrative Discourse; III) Non-impersonal Style; IV) Overt Expression of Persuasion; and V) Situation-dependent versus Elaborated Reference.

Biber (2004) again investigated Korean and Somali language corpora, finding most dimensions were similar to his 1995 study, despite studying different languages.

Biber, Davies, Jones, and Tracy-Ventura (2006) investigated eighty-five lexico-grammatical features in a Spanish language corpus, revealing six dimensions. They were I) 'Oral' and 'Literate' discourse; II) Spoken 'Irrealis' Discourse; III) Narrative Discourse; IV) Addressee Focused Interaction; V) Informational Reports of Past Events; and VI) 'Formal' Written Style. Daems, Speelman, and Ruette (2013) studied language in weblogs, with four patterns identified. They were I) Narration and Instruction, II) Formal and casual, III) Diary and Background Story, and IV) Reflection and Report. Daems, Speelman, and Ruette's (2013) patterns were similar to Biber's (1995, 2004, 2006) and Biber et al.'s (2002), arguing that Biber's patterns proved predominantly universal, not only with the 'entire' spectrum of registers within a language, but also when inspecting a specific register.

Connor and Upton (2013) investigated the patterns of lexico-grammatical features in mail letters. Three hundred and sixteen letters were taken from a hundred and eight organizations. Their results displayed four dimensions namely I) Narrative and Non-narrative Concerns, II) Involved and Informational Production, III) Overt Expression of Persuasion Reference, and IV) Explicit and Situation Dependent. All dimensions compared to Biber's (1995).

Friginal (2009) employed the Biber's corpus–based multidimensional analysis to investigate spoken language in outsourced call centers. Three dimensions were discovered. They were I) Addressee-Focused, Polite, and Elaborated Information vs. Involved and Simplified Narrative, II) Planned, Procedural Talk, and III) Managed Information Flow. All dimensions marked characteristics distinguishing the functional attribute of speakers' discourse.

The multidimensional analysis was again employed by Gozdz-Roszkowski (2011) to study five non-specialist non-legal and seven legal genres. Three-patterns within legal discourse were found, including I) Narrative, Stance-focused versus Informational and Normative Discourse, II) Instructive and Advisory Discourse, and III) Abstract, Elaborated and Operative versus Content-focused Lexically Specific Discourse, with some dimensions similar to Biber's (1995) research

Guinovart (2000) applied the Biber's corpus-based multidimensional analysis to identify the stylistic variables influencing the nature of spoken and written-to-be-spoken English texts, compiling the corpus from the British National Corpus (BNC). The multidimensional analysis led to the distinction of three dimensions, consisting of I) Notional Richness versus Dynamic Deictic Reference, II) Explicitness versus Concision, and III) Favored versus Disfavored.

Louwerse, McCarthy, McNamara, and Graesser (2004) tried to prove the effectiveness of the Biber's corpus-based multidimensional analysis. These four researchers applied the same corpus and methods as Biber (1995), revealing six dimensions: I) Informational and Declarative, II) Speech and Writing, III) Topic Consistency and Topic Variation, IV) Factual and Situational, V) Narrative and Non-narrative, and VI) Elaborative and Constrained, with all dimensions similar to Biber

(1995), Therefore, confirming that a Biber's corpus-based multidimensional analysis is reliable, useful and effective for investigating language in the corpus.

Table 2.1 Summary of the Revealed Dimensions in the Ten Previous Research of Written and Spoken Corpus

Research	Corpus	Dimensions
Biber (1995) **2,737,168 word corpus** **48 aggregated features, Biber's tagger**	BNC and LLC corpus	1. Narrative and Non-narrative discourse 2. Involved and Informational Production 3. Non-impersonal and Impersonal Style 4. Situation-dependent and Elaborated Reference 5. Overt Expression of Persuasion
Biber (2004)	Korean and Somali language corpus	1. Information-focused vs. Interactive discourse 2. Stance vs. Context-focused discourse 3. Narrative-focused discourse
Biber, Conrad, Reppen, Byrd, and Helt (2002) **48 aggregated features, Biber's tagger**	T2K-SWAL corpus	1. Narration and Instruction 2. Formal and casual 3. Diary and Background Story 4. Reflection and Report
Biber, Davies, Jones, and Tracy-Ventura (2006) **20,000,000 word corpus** **85 aggregated features, Jone's tagger**	Spanish Spoken and Written Language corpus	1. Oral and Literate Discourse 2. Spoken Irrealis Discourse 3. Narrative Discourse 4. Addressee Focused Interaction 5. Informational Reports of Past Event 6. Formal Written Style

Table 2.1 (Continued)

Research	Corpus	Dimensions
Connor and Upton (2013) **2,000,000 word corpus** **54 aggregated features** **Biber's tagger**	Mail letter corpus	1. Narrative and Non-narrative Concerns 2. Involved and Informational Production 3. Overt Expression of Persuasion 4. Explicit and Situation Dependent Reference
Daems, Speelman, and Ruette (2013) **8,945,590 word corpus** **21 aggregated features** **PENN Treebank Tagset**	eblogs	1. Narration and Instruction 2. Formal and casual 3. Diary and Background Story 4. Reflection and Report
Friginal's (2009)	Outsourced call center corpus	1. Addressee-Focused, Polite, and Elaborated Information vs. Involved and Simplified Narrative 2. Planned, Procedural Talk 3. Managed Information Flow
Guinovart (2000) **2,890,754 word corpus** **48 aggregated features , AWK tagger**	BNC corpus	1. Notional Richness and Dynamic Deictic reference 2. Explicitness and Concision 3. Favored and Disfavored (sentential length).

Table 2.1 (Continued)

Research	Corpus	Dimensions
Gozdz-Roszkowski (2011)	Legal text corpus	1. Abstract, Elaborated and Operative versus Content-focused Lexically Specific Discourse 2. Instructive and Advisory Discourse 3. Narrative, Stance-focused versus Informational and Normative Discourse
Louwerse, McCarthy, McNamara, and Graesser (2004)	LOB corpus	1. Informational and Declarative 2. Speech and Writing 3. Topic Consistency and Topic Variation 4. Factual and Situational 5. Narrative and Non-narrative 6. Elaborative and Constrained

2.2.1.2 Previous Studies on a Biber's Corpus-based Multidimensional Analysis to Investigate Academic Research Article Corpus

A thorough search of the relevant literature revealed relatively few studies that have applied the Biber's corpus based multidimensional analysis to investigate lexico-grammatical features in research article corpus (e.g. Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003)

Similarly though, Kanoksilpatham (2003) applied the Biber's (1995) corpus-based multidimensional analysis to investigate sixty research articles from top five journals in biochemistry. She found seven lexico-grammatical dimensions. They are I) Conceptual and Specific Reference, II) Concrete Action and Abstract Notion, III) Evaluative Stance, IV) Framing Claims, V) Attribute Knowledge and Current Findings, VI) Expression of Purpose, and VII) Expression of Contradiction.

Baoya (2015) also applied the Biber's (1995) corpus-based multidimensional analysis to investigate his Educational Research Article Corpus (ERC), finding seven dimensions in his study. They are I) Current Information versus Procedural Concerns, II) Evaluative Stance versus Past Actions and States, III)

Logical Probability versus Integrated Information, IV) Commentary, V) Personal Engagement versus Modified Information, VI) Unsatisfactory Status Quo versus Research Conduct, and VII) References to Present Research versus Information Relevant to the Past.

Getkham (2010) studied the application of co-occurring patterns of lexico-grammatical features in the sixty applied linguistic research articles. All articles in her corpus were from five leading applied linguistics journals, unveiling six dimensions, consisting of I) Expression of Purposes, II) Established Knowledge and Expression of Ownership, III) Expression of Generality, IV) Evaluative Stance, V) Conceptual Complexity, and VI) Framing Claims).

As can be seen, Baoya (2015), Getkham (2010) and Kanoksilpatham (2003) disclosed both similar and diverse co-occurring patterns of lexico-grammatical features. The similar co-occurring patterns that were revealed in the three studies were 'Evaluative Stance', 'Established knowledge', 'Framing Claims', and 'Expression of Purpose' while 'Conceptual and Specific Reference', 'Concrete Action and Abstract Notion', 'Attribute Knowledge and Current Findings', and 'Expression of Contradiction' were only found in Kanoksilpatham's (2003) study. 'Established Knowledge / Expression of Ownership', 'Expression of Generality' and 'Conceptual Complexity' were found only in Getkham's (2010) study. 'Procedural Concerns', 'Past Actions and States', 'Logical Probability', 'Integrated Information', 'Commentary', 'Personal Engagement', 'Modified Information', 'Unsatisfactory Status Quo', 'Research Conduct', 'References to Present Research', and 'Information Relevant to the Past' were only found in Baoya's (2015) study. Table 2.2 recapitulates and compares co-occurring patterns revealed in these three studies.

Table 2.2 Summary of the Revealed Dimensions in the Three Previous Studies of Research Article Corpus

Research	Corpus	Dimensions
Baoya (2015) **300,000 word corpus** **44 aggregated features** **POS tagger**	Educational research article corpus	1. Current Information versus Procedural Concerns 2. Evaluative Stance versus Past Actions and States 3. Logical Probability versus Integrated Information 4. Commentary 5. Personal Engagement versus Modified Information 6. Unsatisfactory Status Quo versus Research Conduct 7. References to Present Research versus Information Relevant to the Past.
Getkham (2010) **431,381word corpus** **38 aggregated features** **POS tagger (CLAWS7)**	Applied linguistic research article corpus	1. Expression of Purposes 2. Established Knowledge/Expression of Ownership 3. Expression of Generality 4. Evaluative Stance 5. Conceptual Complexity 6. Framing Claims
Kanoksilpatham (2003) **320,000 word corpus** **41 aggregated features** **Biber's tagger,**	Biochemistry research article corpus	1. Conceptual and Specific Reference 2. Concrete Action and Abstract Notion 3. Evaluative Stance 4. Framing Claims 5. Attribute Knowledge and Current Findings 6. Expression of Purpose 7. Expression of Contradiction

2.2.2 Lexico-grammatical Features

The terms ‘lexico-grammatical features’ and ‘linguistic features’ showed similarity in Biber’s (1995) study, including 1) tenses and aspects, 2) grammatical voices, 3) private, public, and suasive verbs, 4) first pronouns (I, you, we), 5) pronoun ‘It’, 6) demonstrative, 7) hedges, 8) possibility, necessity, and prediction modals, 9) synthetic and analytic negations, 10) ‘be’ as a main verbs, 11) general emphatics, 12) causative subordinations, 13) relative clauses, 14) ‘that’ deletions, 15) non-phrasal coordinating conjunctions, 16) sentence relatives, 17) ‘wh’ questions, 18) place and time adverbials, 19) nouns, 20) word length, 21) type/token ratio, 22) predicative and attributive adjectives

Lexico-grammatical features are typical of academic language. These features are introduced in this section due to the focus of this dissertation. Several studies investigated lexico-grammatical features in various contexts. For example, Biber and Conrad (2009) discovered that in academic prose, nominalizations, prepositional phrase after nouns and attributive adjectives are commonly used, while personal pronouns are rarely applied, or that present tense is more frequently used than the past tense, whereas modal auxiliaries are uncommon. Passives consist of about a quarter of all verbs. Also, time and place adverbials are rare in academic prose. Hiltunen (2010) investigated the use of grammatical constructions in research articles from four disciplines and found differences in the usage of declarative and interrogative clauses and as-predicative constructions. These studies show that while it is possible to see general trends on the prominent grammatical features of academic discourse, there are still considerable variations inside the research articles.

Tenses and aspects are the most discussed features, expressing time at, during, or over which a state or action denoted by a verb occurs. The change of tense choices can indicate a change in meaning. Tense use is not only about transforming one verb form to another but it is also a temporal implicature (Halliday, 2013).

2.2.2.1 Tenses and Aspects

Numerous scholars have investigated tenses and their aspects in research articles and unveiled a complicated view of them (e.g. Barber, 1962 as cited in Rizzo, 2009; Biber, Conrad & Reppen, 1998; Celce-Murcia & Larsen-Freeman, 1999; Gerbert, 1970; Getkham, 2010; Gunawardena, 1989; Halliday & James, 1993;

Hanania & Akhtar , 1985; Hawes & Thomas, 1997; Heslot, 1982; Kanoksilpatham, 2003; Malcolm, 1987; Oster, 1981; Swale & Feak, 2004; White, 2004). The native English researcher relies on three main aspects of tenses (past simple, present simple, and present perfect) to write their research articles (Hartwell & Jacques; 2014; Taylor, 2001)

'Present simple' provides two main communicative functions in the research article. One is to situate a particular event and the other is to mark a particular proposition as a generalization (Swales, 2004). In the latter case, the use of 'present simple' indicates that the propositional information is valid regardless of time. Several studies established that 'present simple' is frequently used in the Introduction to describe established knowledge and in the Discussion to discuss results, as well as to emphasize the generality of their specific findings. Sometimes, it can be used to explain or discuss figures, tables, or graphs and discuss the significance of the findings in the Results. (Barber, 1962 as cited in Rizzo, 2009; Biber, Conrad, & Reppen, 1998; Charak & Norouzi, 2013; Getkham, 2010; Gerbert, 1970; Gledhill, 2000; Hanania & Akhtar, 1985; Hawes & Thomas, 1997; Heslot, 1982; Hyland, 1994; Li & Ge, 2009; Malcolm, 1987; Matthews & Matthews, 2007; Salager-Meyer, 1992a; Smith & Bernhardt; 1997; Swale & Feak, 2004; Taylor, 2001; Trimble & Trimble, 1982; White, 2004).

'Past simple' provides two communicative functions in the research article, namely to claim non-generality about views expressed by previous studies and to describe research activities or procedures performed (Kanoksilpatham, 2003). It is frequently used in the Methods to describe methodology, and in the Results to report the findings (Barber, 1962 as cited in Rizzo, 2009; Burrough-Boenish, 2003; Charak & Norouzi, 2013; Biber, Conrad & Reppen, 1998; Gerbert, 1970; Getkham, 2010; Gledhill, 2000; Hanania & Akhtar, 1985; Hawes & Thomas, 1997; Heslot, 1982; Hyland, 1994; Malcolm, 1987; Matthews & Matthews, 2007; Salager-Meyer, 1992a; Smith & Bernhardt; 1997; Swale & Feak, 2004; Taylor, 2001; Trimble & Trimble, 1982; White, 2004).

'Present perfect' is mostly used to refer to areas of studies (Swales & Feak, 2004). It predominates in the Introduction and the Discussion (Gunawardena, 1987; Matthews & Matthews, 2007; Schramm, 1996; Swales & Feak, 2004; Taylor,

2001). Table 2.3 recapitulates communicative functions of ‘present simple’, ‘past simple’ and ‘present perfect’ in the research article.

Table 2.3 Communicative Functions of ‘Present Simple’, ‘Past Simple’ and ‘Present Perfect’ in the Research Article

Tense	Temporal Location	Meanings	Communicative Function
Present simple	Coincides with the present moment or extends over a period of time including the present moment	Complete and unchanging; immediate factuality	Stative: describes what is contained or shown in the paper - statement of purpose when the paper is viewed as a complete - reference to figures or tables Performative: describes an action that is accomplished by the uttering of it - statement of purpose when the paper is viewed as a work in progress, signing the activity as occurring simultaneously with the moment of writing Immediate factuality: represents the writer's present mental state or what the writer avers to be truth - writer's commentary and evaluation, presenting the writer's opinions and interpretations

Table 2.3 (Continued)

Tense	Temporal Location	Meanings	Communicative Function
			Timeless generalizations: adds a timeless dimension to enhance generalizability; depicts unchanging entities - reference to previous research, presenting the cited work as established knowledge and emphasizing the current relevance of the cited work
Past simple	Prior to the present moment of reading and writing	Completeness and remoteness; past facts	Events, actions, or processes completed in the past: - recapitulation, refer to what was said earlier in the paper - introducing secondary or primary source where a specific date is stated or a past time frame is implied - reference to historical events and participants in the events - reference to biographical information - reference to experimental research, focusing on the specific procedures used and experiments performed description of apparatus designed for a specific experiment

Table 2.3 (Continued)

Tense	Temporal Location	Meanings	Communicative Function
Present perfect	From some point in the past up to the present moment of reading and writing	Retrospective point of view from the present to a time prior to now	Relating a past situation to the present moment: - recapitulation, referring to what has been said up to this point in the paper - conveying generalization without committing to the future: - reference to past research: refer to what has been done so far on a related topic in the field and placing the present work in relation to other works in the discourse community Referring to a prior situation with current relevance: - reference to past experiments with direct relevance to the current study

As can be seen, previous studies illustrated that tense choices in research articles no longer depend on ‘time lines’ as described in traditional grammar. The non-temporal use of tenses in research articles is actually constrained by communicative functions and the conventional sections of research articles. Next, the researcher will discuss grammatical voices and their rhetorical functions.

2.2.2.2 Passive Voices

English sentence can be either in active or passive voice. In a passive voice structure, the process done is placed first and the actor is sometimes added at the end preceded by the word ‘by’. Passive voice might be used in cases, such as

where the actor is unknown or irrelevant, the writer wants to be vague about who is responsible, or to highlight the process or action done. Passive voice is frequently employed to writing academic and research papers.

Several studies were conducted to investigate active and passive voices and their rhetorical functions (e.g. Alvin, 2014; Amdur, Kirwan, & Morris, 2010; Corson & Smollett, 2013, 2014; Getkham, 2010; Gross, Harmon & Reidy, 2002; Kespratoom & Kitjaroenpaiboon, 2007; Kirkman, 1975; Martin-martin, 2003; Millar, Budgell & Fuller, 2013; Seoane, 2013; Sigel, 2009; Tarone et. al., 1981, 1998; Weissberg & Buker, 1990; Wingard, 1981).

Passive voice provides a communicative function called 'depersonalization' (Gross, Harmon, & Riedy, 2002). It is frequently used to describe what was done in the Methods and the Results of research articles since researchers wants to emphasize the materials and methods more than themselves (Alvin, 2014; Amdur, Kirwan, & Morris, 2010; Kespratoom and Kitjaroenpaiboon, 2007; Martın-martin, 2003; Swales & Feak, 2004, Tarone et al., 1981, 1998; Wingard, 1981). The possible reasons why passive voice is frequently used in research articles are to avoid uses of first person pronouns, to reflect objectivity, to avoid responsibility, and to appear scholarly sophisticated (Amdur, Kirwan, & Morris, 2010). However, studies found a decline of passive voice in research articles (Millar, Budgell & Fuller, 2013; Seoane, 2006). The decline might be because the researcher tends to write the research article as clearly and concisely as possible (Corson & Smollett, 2014; Kirkman, 1975; Seoane, 2013; Sigel, 2009).

2.2.2.3 Private, Public, and Suasive Verbs

In this section, concepts and previous studies of private, public, and suasive verbs, proposed by many scholars, (Ayers, 2008; Baoya, 2015; Biber, 1995; Hartwell & Jacques, 2014; Kanoksilpatham, 2003; Palmer, 1974; Quirk et al., 1985; Harwes & Thomas, 1997) were reviewed and discussed.

'Private verbs' refer to unobservable states or activities that the speaker alone is aware of (Hawes & Thomas, 1997; Palmer, 1974; Quirk et al., 1985). They usually occur with the non-progressive forms. Biber (1995) listed some private verbs, namely assume, ascertain, anticipate, accept, believe, check, conclude, calculate, consider, conjecture, deduce, decide, determine, demonstrate, deem, etc. 'Public

verbs' imply the idea of speaking. They often co-occur with a that-clause to express a factual proposition (Ayers, 2008; Baoya, 2015; Harwes & Thomas, 1997; Quirk et al., 1985). Public verbs are such as add, acknowledge, affirm, admit, etc. 'Suasive verbs' are persuading verbs, often accompanied by a that-clause, together with the mandative subjunctive, or with the putative 'should' (Biber, 1995). Biber listed some suasive verbs, such as agree, allow, arrange, ask, beg, etc.

In research articles, public verbs are used to report generalized conclusions of cited studies and report scientific results and experimental findings of the studies while private verbs are used to introduce cited research (Hawes & Thomas, 1997) while private and public verbs function to 'frame claims' (Biber, 1995; Kanoksilpatham, 2003). As can be seen, various verbs play roles in research articles and could provide different communicative functions.

2.2.2.4 First Person Pronouns

Another important lexico-grammatical feature in research articles is pronouns. In this section, concepts proposed by several scholars and their previous studies were reviewed and explained (e.g. Carter-Thomas & Chambers, 2012; Flottum et al., 2006a, 2006b, 2007, 2013; Gjesdal , 2013; Glasman-Deal, 2010; Gray, 2010; Gray & Cortes, 2011; Grossmann, 2013; Halliday & Hasan, 1976; Hartwell & Jacques, 2014; Hewings & Hewings, 2002; Hunston & Francis, 2000; Hunston & Sinclair, 2000; Hyland, 2001; Janet, 1994; Jeanne, 2011; Lenko-Szymanska, 2004; Martin, Matthiessen, & Painter, 1997; McCarthy, 1994; Muhlhausler & Harre, 1990; Oh, 2009, 2012; Oxford English Dictionary, 2013; Petch-Tyson, 2000; Quirk et al., 1985; Rodman, 1994; Sancho-Guinda & Hyland, 2012; Schmid, 2000; Strauss, 1993; 2002; Swales, 2005; Swales & Feak, 2000, 2004; Tarone et al., 1981, 1998; Thompson, 2013; Vincent, 2010; Zinsser, 2006)

Pronouns are words that substitute nouns. They can refer to the participants in the discourse or to someone or something mentioned elsewhere. Most scholars proposed that first person pronouns are important in written discourse because they can perform an authorial stance, engagement, and convey power (Hartwell & Jacques, 2014; Hyland, 2002a; Swales & Feak, 2004). The first person pronouns frequently used in research articles are 'we', 'us', 'our', or 'ours' (Bazerman, 1988).

‘We’ is a rhetorical device, allowing a user to distance himself from what is being said or written. In research articles, ‘we’ is more acceptable because it represents the group rather than an individual (Muhlhausler and Harre, 1990). Several scholars found that ‘we’ is used in most research articles even in singularly authored articles (Biber & Gray, 2010; Glasman-Deal, 2010; Hyland, 2001; Kanoksilpatham, 2003)

The ‘we’ can be divided into two sub-categories namely inclusive (readers are included) and exclusive (readers are excluded). The inclusive ‘we’ helps engage the readers into the discourse and creates solidarity (Flottum et al., 2006). The exclusive ‘we’ helps the authorial self-reference and is used to describe actions or arguments of the researcher in the research article (Flottum et al., 2006; Hyland, 2006, 2012).

2.2.2.5 Third Person Pronouns

In research articles, researchers employ third person pronouns to refer to the population being studied or other researchers when citing related studies in his research (Kuo, 1999).

2.2.2.6 Pronoun ‘It’

Pronoun ‘it’ provides two functions, namely referring and non-referring functions. The referring ‘it’ (or impersonal pronoun ‘it’) is employed to refer to inanimate objects, uncountable substances, singular collections of people, and singular abstractions. The non-referring ‘it’ (extraposed ‘it’) is used as a prop subject, especially in expressions denoting atmospheric conditions, distance, and time (Biber et al., 1999; Quirk et al., 1985). Simply put, the extraposed ‘it’ refers to the use of the pronoun ‘it’ in the grammatical subject position, followed by ‘that’ or ‘to’ complementary clauses governed by either verbs or adjectives (Hewings & Hewings, 2002; Hunston & Sinclair, 2000; Martin, Matthiessen, & Painter, 1997; Quirk, 1985; Rodman, 1994). In research articles, the extraposed ‘it’, followed by a verb or an adjective, is principally used to present the author’s comment (e.g. It is possible that, It suggests that), to catch the readers’ attention (e.g. it is noteworthy that) and to mark the authors’ attitude (e.g. it is preferable that) (Rodman, 1994). The extraposed ‘it’ can also function as hedging, expressing attitude, expressing attribution, and emphasizing (Hewings & Hewings, 2002; Kanoksilpatham, 2003).

2.2.2.7 Demonstrative Pronouns

Demonstrative pronouns have their own referential meaning depends on the context they occur. Also, their uses may be considered as reference to an earlier part of the discourse (anaphoric), as reference to a later part of the discourse (cataphoric), or as reference to the extra-linguistic situation (situational reference) (Halliday & Hasan, 1976). For example, ‘this’ and ‘that’ are used to refer to a single thing or idea. ‘These’ and those’ are used to refer to things or ideas. However, ‘this’ and ‘these’ are used when a thing or things are near in distance or time while ‘that’ and ‘those’ are far (Quirk et al., 1985).

The demonstrative pronoun in the research article mark referential cohesion and refer to the immediately preceding text or the immediate textual context (Biber et al., 1999). They aid in the establishment of shared knowledge between readers and the authors (Kanoksilpatham, 2003). In the next section, some concepts, descriptions, and previous studies of 'downtoners and hedges' are presented.

2.2.2.8 Downtoners and Hedges

In this section, some concepts and definitions of downtoners and hedges proposed by Quirk et al. (1985) and Biber (1995), including previous studies done by several scholars, were reviewed and then discussed (Crismore & Vande Kopple, 1997; Grabe & Kaplan, 1997; Hyland, 1998, Kanoksilpatham, 2003; Myers, 1997; Precht, 2000; Salager- Meyer, 1997; Thompson, 1994).

Biber’s (1995) hedges and Quirk et al.’s (1985) downtoners show similarities, where, both lower the effect on the force of the predication or verb. Several studies have been conducted to investigate hedges (e.g. Biber, 1995; Chismore & Vande Kopple, 1997; Grabe & Kaplan, 1997; Hyland, 1996; Kanoksilpatham, 2003; Myers, 1997; Precht, 2000; Salager-Meyer, 1997), and it was agreed upon that the use of hedges used in research discourse are not impersonal.

Hedges allow authors to express uncertainty and to present their proposition cautiously, accurately, and modestly (Hyland, 1996; Salager-Meyer, 1997). Hedges can be found in many parts of speech. Hyland (1996) showed some samples of verb hedges (e.g. propose, appear, seem, indicate, suggest), adverb hedges (e.g. almost, quite, probably, fairly, possibly), adjective hedges (e.g. likely, probable)

and modals (may, might, can, could, would). Some hedges can be used in conditional clauses (e.g. under these circumstances) and sentences (e.g. nothing is shown about).

In research articles, hedges help protect researchers' statements and are frequently found in the Introduction and the Discussion. This is due to their purpose to convince readers that more research work needs to be pursued in the area of inquiry and to show the work being presented is justified (Salager-Meyer, 1997). In the next section, concepts, descriptions, and previous studies of 'Possibility, Necessity, and Prediction Modals' are reviewed.

2.2.2.9 Possibility, Necessity, and Prediction Modals

Modals are well established in ESP as devices marking the author's assessment of propositions (Biber et al., 1999; Salager-Meyer, 1994). Modals consist of possibility, necessity, and prediction modals (Kanoksilpatham, 2003). Possibility modals (can, could, may, might) denote the authors' assessment of the possibility of the propositions presented in hypothetical scenarios. Necessity modals (must, should, ought to) convey personal obligation of certain events (Biber et al., 1999). Prediction modals (will, would, shall) mark predictions of events or outcomes (Hyland, 1994; Salager-Meyer, 1994). In the next section, concepts, descriptions, and previous studies of 'syntatic and analytic negation' are reviewed.

2.2.2.10 Synthetic and Analytic Negation

To help define negation, it is maintained that 'synthetic negation' refers to 'no' and 'analytic negation' refer to 'not' (Biber, 1995). 'No' negation can be used as pronouns and determiners, while 'not' is an adverb (Biber et al., 1999). However, 'not' has a special characteristic, where the main use of 'not' is to negate a sentence. This can be done by adding a negator after the operator of the verb phrase (Quirk et al., 1985). In research articles, analytic negation denotes negativity for the purpose of exclusion, negation, denial, rejections, and questioning (Kanoksilpatham, 2003). In the next section, concepts, descriptions, and previous studies of 'be as a main verb' are reviewed.

2.2.2.11 'Be' as Main Verbs

'Be' is the fundamental verb used to indicate the existence of an entity or to relate an entity to its qualities or characteristics. In linguistics, it is sometimes known as a copula. Unlike transitive verbs, it does not take a direct object, but a

complement, since the subject and complement of the verb ‘be’ relate to the same entity. The complement of ‘be’ can be a noun, a noun group, an adjective, or a prepositional phrase (Biber et al., 1999).

2.2.2.12 Emphatics

Emphatics consist of numerous grammatical features. They include the emphasizer (for sure), the intensifying (such), the booster (a lot), the auxiliary (do) in an emphatic function or the periphrastic comparison with ‘more, most’ (Biber et al., 1999). The emphatics reinforce effect on the truth value of the clause, denote a high degree, a high point on the scale, and emphasize the meaning of the whole following predicate (Hyland, 2004; Quirk et al., 1985).

2.2.2.13 Causative Subordinations

Subordinators or subordinating conjunctions are words introducing dependent clauses (Biber et al., 1999). They have syntactic roles. This distinguishes them from other clause initiators (wh-words), which can also have a role as subject, object, adverbial, etc. Biber (1995) also stated that ‘because’ is the only subordinator to function unambiguously as a causative adverbial. Other forms, such as ‘as, for, and since’, can have a range of functions, including causative. Biber et al. (1999) gave an informative overview of these ambiguous functions shown in Table 2.4.

Table 2.4 Example Use of Causative Subordinations

Form	Sub.	Prep.	Adv.	Examples
for	✓			I concede the point, for I have stated it many times in the past.
		✓		Oh we’re quite happy to rent for a while.
since	✓			But this day is something I’ve dreamed of since I was a kid.
		✓		Since Christmas, sales have moved ahead.
			✓	She had not heard one word from him since
though	✓			She had never heard of him, though she did not say so.

Table 2.4 (Continued)

form	Sub.	Prep.	Adv.	Examples
			✓	That's nice though isn't it?
like	✓			Here today and gone today, like I said.
		✓		Like many marine painter, he had never been at sea.

Source: Biber et al., 1988.

Note: Sub. refers to subordinator. Prep. refers to preposition. Adv. refers to adverb

2.2.2.14 'That' Complement Clauses

The use of 'that' complement clauses can be applied in different syntactic categories (e.g. nouns, verbs, adjectives). The 'that' complement clause controlled by verbs, index information, integration and expansion of the idea-unit. Specifically, the 'that' complement clauses controlled by verbs provide a means to talk about the information in 'that' clauses. The verbs commonly controlling 'that' complement clauses are likelihood verbs (e.g. appear, seem, presume, think, consider), factual verbs (e.g. demonstrate, confirm, find, show, decide), and attitudinal verbs (e.g. agree, expect, hope, feel). The 'that' complement clauses controlled by adjectives, index expression of the user's agreement, opposition, evaluation, and interpretation of propositions. The adjectives controlling 'that' complement clauses are likelihood adjectives (e.g. likely, possible, probable), attitudinal adjectives (e.g. interesting, acceptable, necessary), and factual / certainty adjectives (e.g. impossible, evident, obvious) (Biber, 1995; Kanoksilpatham, 2003; Winter, 1984).

2.2.2.15 Wh-clauses

A Wh-clause is a relative clause, acting as a modifier for a noun or noun phrase (Richards et al., 1992) and is usually introduced by a relative pronoun such as that, which, who, when, or where. A relative clause gives additional information

about the head nouns (Bazerman, 1984, 1988; Eastwood, 1999; Swan, 1996; Thomson & Martinet, 1993).

2.2.2.16 ‘That’ Deletion

‘That’ is deleted when a that-clause becomes a complement or direct object and when a subject of that-clause is extraposed ‘it’ (Quirk et al., 1985). Biber (1995) restricts his definition to the subordinator-that deletion and found the following three rules:

Rule I) SUA or PUB or PRV + PRO or N + AUX or V

Example:

I	think	(that)	you	can	do	that
PRON	PRV		PRO	AUX	V	PRON

Rule II) SUA or PUB or PRV + ADJ or ADV or DET or POSSPRO + (ADJ) + N + N + AUX or V

Example:

I	explained	the thing	(that)	you	told	me
PRON	PUB	DET + N		N	V	PRON

Rule III) SUA or PUB or PRV + demonstrative pronoun or SUBJPRO.

Example:

The news	reported	(that)	this	drug	is	illegal
N	PUB		Demonstrative PRON	N	V	ADJ

2.2.2.17 Coordinating Conjunctions

Coordinating conjunctions are applied to build coordinate structures, in both phrases and clauses (Biber et al., 1999). Unlike prepositions and subordinators, coordinating conjunctions link elements which have the same syntactic role. The main coordinators are and, but, and or, with a core meaning of addition, contrast, and alternative respectively. Coordinating conjunctions are divided into ‘phrasal’ and ‘clausal’ coordination. If the coordinated elements cannot be identified to be extending a simple noun phrase, we speak of ‘clausal coordination’. This feature

provides functions of expanding and connecting idea units at different levels of clauses and phrases (Biber et al., 1999). The complexity of phrases and clauses in research articles reflect the typical complexity of the subject matter and the density of information (Biber et al., 1999).

2.2.2.18 Sentence Relatives

Biber et al. (1999) noted that some types of relative clauses are not used as postmodifiers of nouns. This is true of nominal relative clauses, where the wh-word can be regarded as representing both the antecedent and the relativizer. It also applies to so-called sentential relative clauses or sentence relatives, introduced by 'which'. In addition to this, Quirk et al. (1985) observed a syntactic feature that is very important for automatic parsing of sentence relatives. Sentential relative clauses parallel nonrestrictive postmodifying clauses in noun phrases in that they are separated by intonation or punctuation from their antecedent. They are commonly introduced by the relative word 'which'.

2.2.2.19 Nouns

Nouns can function as subject, object, including complement of clauses and prepositional phrases (Quirk et al., 1985). Nouns fall into different sub-classes. Quirk et al. (ibid) described the subclasses of nouns with the following diagram:

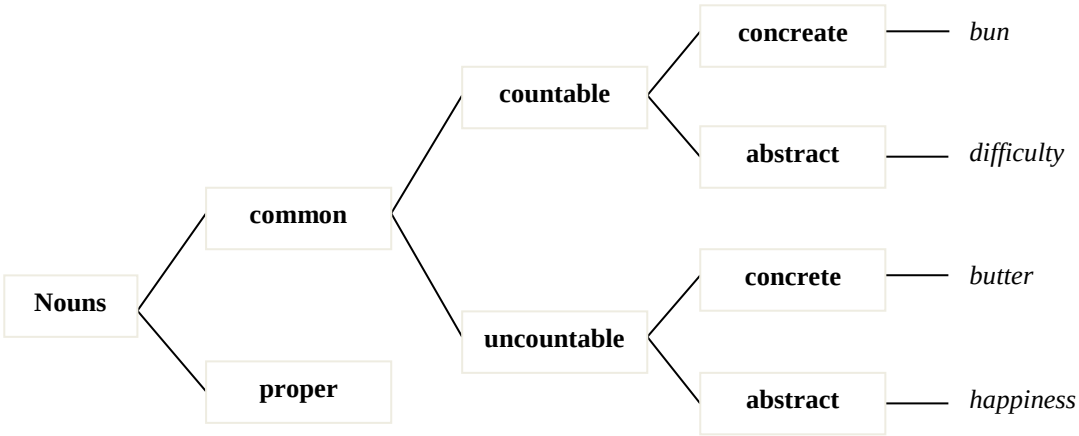

Figure 2.2 Different Classes of Nouns

Proper and common nouns are the principal means by which the researcher refers to entities or concepts (Kanoksilpatham, 2003). Nominal elements are used as a main lexical means of referential specification or to establish what the text is about (Biber et al., 1999).

2.2.2.20 Average Word Length

Average word length refers to the mean length of the words in a text, in orthographic letters (Biber, 1995). Biber also stated that the higher the average word length of text, the higher the informational density. Hence, this feature indexes a focus on information (Kanoksilpatham, 2003).

2.2.2.21 Type / Token Ratio

Type / token ratio (TTR) is the ratio between the number of different lexical items in a text and the total number of words in that text (Biber, 1995). TTR is a percentage = (types / token) x100. Longer text tends to have more repeated words and thus a much lower TTR. If TTR in the text is low, it means there are many more repeated words in the text. If TTR is high in the discourse, it means that the text has fewer repeated words and greater lexical density. High TTR in a text indicates that the discourse has a greater variety of word types and an integrated higher amount information.

2.2.2.22 Predicative and Attributive Adjectives

Predicative adjectives and attributive adjectives are used to modify nouns (Biber et al., 1999). The attributive adjective is significant in the research article. It allows the researcher to describe, clarify, and qualify additional information about scientific phenomena or entities (Biber et al., 1999; Kanoksilpatham, 2003) while predicative adjectives provide the researcher with a means to express their stance (Auria, 2008; Charles, 2006a; 2006b; Hunston & Thompson, 2001; Getkham, 2010; Soler, 2002; Tutin, 2009).

2.2.2.23 Adverbs

Adverbs can provide different communicative functions. They usually mark the writers' attitudes and feelings to the proposition. They indicate some degree or quantity of the quality represented by the verb, adjective or the adverb that they pre-modify (Baoya, 2015; Hyland, 1998, Sack, 1971; Varttala, 1999; Ventola, 1997).

2.2.2.24 Split Auxiliaries

Split auxiliary is when an adverb is placed between an auxiliary and a following verb (Quirk et al., 1985). It marks the user's attempt to persuade the readers (Biber, 1995). It can create emphasizing effects (Quirk et al., 1985).

2.2.2.25 To Infinitives

Infinitives can be used to integrate or expand ideas-units in both written and spoken discourse to introduce an aim, goal, objective, and purpose, to introduce a method, to frame points in a discussion, to introduce a complement and as an adverbial purpose clause (Chafe, 1985, as cited in Niko, 1994; Getkham, 2010).

2.2.2.26 Gerunds

Gerunds are a type of verbal that ends in -ing and is used like a noun. Similar to infinitives and nominalization, gerunds can also function as the subject of the sentence, the direct object, or as the subject complement. Gerunds can also act as an object of a preposition. (Grieve et al., 2008). With a gerund, the user tries to focus more on the action (Halliday, 1998).

2.2.2.27 Participial Clauses

Participial clauses are shortened, dependent clauses and a form of adverbial clauses, enabling the user to provide information economically. (Biber, 2004).

2.2.3 Summary of Lexico-grammatical Features and Their Communicative Functions in Research Articles

Lexico-grammatical features have been the focus of several studies. Some studies investigated only one lexico-grammatical feature to find its communicative function while others studied sets of features. The review of literature on lexico-grammatical features showed that lexico-grammatical features in research articles are no longer restricted to the functions as described in traditional grammar, but can have their specific communicative functions. Table 2.5 summarizes communicative functions of each lexico-grammatical feature used in research articles.

Table 2.5 Communicative Functions of Each Lexico-grammatical Feature in Research Articles

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar (s)
Present simple	To represent observations, descriptions, definitions, repeated actions, material properties, universal laws, and processes	Lackstrom et al. (1973) and Oster (1981)

	To represent 'timelessness' and emphasizes objective experience and the abstract, subjective ideas	Malcolm (1987)

	To emphasize the relation of previous research	Salager-Meyer (1992)

	To describe reported past research To discuss the results.	Tod-Trimble and Trimble (1982)

	To talk about given information	Halliday (2013)

	To mention previous facts or statements To mention precedent knowledge	Smith and Bernhardt (1997)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar (s)
Present simple	To address background information and the importance of the study in the introduction sections.	Swales and Feak (2004)
	To indicate that the writers believe the research findings are still true and relevant, even though those research studies may have been conducted long time ago.	
	To explain or discuss about figures, tables, or graphs in the findings section	
	To explain significance of the results.	
	---	Taylor (2001)
	To describe what is contained or shown in the paper	
	To describe an action that is accomplished by the uttering of it	
	To represent the writer's present mental state or what the writer avers to be truth	
	To add a timeless dimension to enhance generalizability; depicts unchanging entities	
	To describe procedures habitually used	

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar (s)
Present simple	To emphasize previously ratified knowledge in most of the introduction and the discussion sections	Hartwell and Jacques (2014)
	To indicate that the propositional information is valid regardless of time	
	To situate a particular event in the present tense and the other is to mark a particular proposition as a generalization	Swales (2004)

	To express generality	Getkham (2010)

	To mention precedent knowledge or universal truth	Li and Ge (2009)
	To emphasize the generality of their specific findings in the discussion section	

	To discuss or quoting some established knowledge especially in the introduction and discussion section.	Matthews and Matthews (2007) and Charak and Norouzi (2013)
Past simple	To represent 'time boundedness'	Malcolm (1987)
	To emphasize the current experiment	

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar (s)
Past simple	To indicate the undeveloped previous results. --- To describe apparatus in the methods sections To present research results in the result section --- To talk about new information --- To report the methods and findings of the current research To provide unprecedented knowledge --- To describe what was done in the current study in the methods section (with 'passive voice') To detail the obtained results in the findings section. --- To explain events, actions, or processes completed in the past: To describe apparatus designed for a specific experiment. ---	Salager-Meyer (1992) Todd-Trimble and Trimble (1982) Halliday (2013) Smith and Bernhardt (1997) Swales and Feak (2004) Taylor (2001)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar (s)
Past simple	To describe what they did and what they found in the methods and the results sections.	Hartwell and Jacques (2014)
	To claim non-generality about views expressed by previous studies	Kanoksilpatham (2003)
	To describe research activities or procedures performed	

	To mark particular events, activities occurring during the study	Getkham (2010) and Charak and Norouzi (2013)
	To report research findings	
	To mark generality to science	
	To report results or provide some current knowledge gained from the current study	Gradhill (2000), Burrough-Boenish (2003), and Matthew and Matthew (2007)
	To describe the methods and data of the experiment	
Present prefect	To describe a group of past experiment relevant to the current study	Gunawardena (1987)

	To talk about precedent knowledge which is relevant to unprecedented knowledge is reported.	Schramm (1996)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar (s)
Present prefect	To mention previous facts or statements (precedent knowledge) that affect the researcher' current study	Smith and Bernhardt (1997)

	To communicate the 'recency' or 'currency' of previous research studies.	Swales and Feak (2004)

	To relate a past situation to the present moment: To refer to a prior situation with current relevance	Taylor (2001)
	To refer to other previous research. To imply that the result of previous studies is still true and relevant today To connect the previous research with the present study.	Matthews and Matthews (2007)
Active voices	To explain the author's own work	Tarone et al. (1981)

	To describe an apparatus built or employed in the reported research (with 'simple present tense')	Wingard (1981)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar (s)
Passive voices	To avoid mentioning who did the titrating and the dissolving	Corson and Smollett (2014)

	To report the methods and materials of their studies (with 'simple past tense')	Martın (2003)

	To describe what was done methods section (with 'simple past tense')	Swales and Feak (2004) and
	To discuss previous research	Tarone et al. (1981)
	To describe the work of other researchers	

	To describe the sequential procedures of the current research.	Baoya (2015), Bazerman (1988),
	---	Hannia and Akhtar (1985), Getkham (2010), Kanoksilpatham (2003), Riley (1991), Swales (2004), Trimble and Trimble (1982), Wilkinson (1992), and Wingard (1981)
	To depersonalize the author himself from the writing	Gross, Harmon and Reidy (2002)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar(s)
Type/Token Ratio	To indicate that the discourse has a greater variety of word types and integrated a higher amount information (If high TTR in a text is shown)	Biber (1995)
Gerunds	To function as the subject of the sentence, the direct object, or as the subject complement. To act as an object of a preposition. To focus on action rather than doers.	Biber (1995), Grieve et al. (2008), Halliday (1994; 1988), Halliday and Martin (1993), Myers (1994)
Public verbs	To express a factual proposition (with that-clause) --- To report generalized conclusions of cited studies whereas the certainty verbs (e.g. state, report, note) are used to report scientific results and experimental findings of the studies To frame claims --- To state the propositions in reported speech --- To talk about evaluation, information or findings	Quirk et al. (1985) Hawes and Thomas (1994) Baoya (2015) Ayers (2008)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar(s)
Private verbs	To introduce cited research To recount views or ideas generally held by the research community To frame claims	Hawes and Thomas (1994)
First Person Pronouns	To reflect the active role of the authors and the personalizing characteristics of research discourse	Bazerman (1988)

	To reflect the active role of the authors and the personalizing characteristics of research discourse. To exert authors' authority in addressing intellectual research questions and constructing relevant strategies to answer those questions	Kanoksilpatham (2003)

	To perform authorial stance To describe actions or arguments of the authors and not a positioning of the reader through the use of an all-inclusive pronoun	Hartwell and Jacques (2014)
Third Person Pronouns	To refer to other researchers when writers cite studies related to their research. To create a research space	Kuo (1999)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar(s)
Pronoun 'It'	To provide a mean for authors to express their comments and attitudes without making their identification explicit	Quirk et al. (1985), Biber et al. (1999), Hewings and Hewings (2002), Hunstun and Sinclair (2000), Martin, Matthiesssen, and Painter (1996)
Demonstrative Pronouns	To signal high focus on the referent to which the writer wants to draw the reader's attention	Rodman (1991)

	To signal a focus and topicality in texts	Strauss (2002)

	To reduce potential ambiguities that often result from the use of pronominal this and also to endow the text a more professional style	McCarthy (1994)

	To be used as pronouns as well as determiners	Swales and Feak (2004)

	To refer to a complex predication.	Gray (2010)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar(s)
Downtoners and Hedges	To allow authors to express uncertain scientific propositions, conveying the truth of the statement as far as can be determined as well as the authors' attempt to express their propositions as precisely as they can	Hyland (1996)
	To prevent the author from direct responsibility	

	To allow authors to be accurate in expressing their propositions, to cover themselves and to avoid direct personal responsibility for their statements. To allow authors to be modest in stating their propositions especially in specialized journals whose readers are expert in the field	Salager-Meyer (1997)
	To protect author's statements	
	To convey precision, imprecision, and interpersonal positive politeness	
Possibility Modals	To express permission and possibility and ability	Quirk et al. (1985)
Necessity Modals	---	
Prediction Modals	To be used as devices marking the author's assessment of propositions.	Biber et al. (1999), Ventora (1997), and Salager-Meyer (1994)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar(s)
	Possibility modals denote the authors' assessment of the possibility of the propositions presented in hypothetical scenarios	Kanoksilpatham (2003)

	Necessity modals convey personal obligation of certain events	Biber et al. (1999)

	Prediction modals mark predictions of events or outcomes	Hyland (1994) and Salager-Meyer (1994)
Synthetic and Analytic Negation	To denote negativity in research articles for the purpose of exclusion, negation, denial, rejections, and questioning.	Baoya (2015), Kanoksilpatham (2003)
	To index the authors' expression of non-substantiated findings.	
'Be' as a Main Verb	To be used as an aspect auxiliary	Biber et al.(1999)
	To be used as a passive auxiliary	
	To be used as a main verb	
	To link the subject noun phrase with a subject predicative or obligatory adverbial	
Emphatics	To reinforce effect on the truth value of the clause or part of the clause in which they are applied	Hyland (2004), Quirk et al. (1985)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar(s)
Emphatics	To emphasize the meaning	Biber et al. (1999)
Causative Subordinations	To introduce dependent clauses	Biber et al. (1999)
That and WH Clauses	To modify key aspects of how journals are presented, both providing additional information and, very often, imparting a positive 'spin' to that information. To delineate a specialized area of expertise and claiming a central significance in this area	Tse and Hyland (2010)

	To index information integration to expand idea-unit	Biber (1995)

	To talk about the information in the independent clause (the authors' stance is given in the main clause and the propositional information is given in the 'that' complement clause)	Winter (1984)

	To index information integration and expansion of the idea-unit. To talk about the information in 'that' independent clause	Kanoksilpatham (2003)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar(s)
'That' Deletion	To shorten the complex sentence (adjective clause)	Biber et al. (1999)
Non-phrasal	To build coordinate structures, both phrases and clauses	Biber et al. (1999)
Coordinating	To link elements which have the same syntactic role	
Conjumctions	To expand an idea unit which is more complex (the complexity of phrases and clauses in research articles reflects the typical complexity of the subject matter and the density of information in research studies).	
Sentence Relatives	To represent both the antecedent and the relativizer	Biber et al. (1999)
Place Adverbials	To express positional condition	Quirk et al. (1985)
Time adverbials	To express temporal condition	Quirk et al. (1985)
Predicative and	To be used as subject predicative complementing a copular verb or object	Biber et al.(1999)
Attributive Adjectives	predicative following a direct object	
	To modify nominal expressions, preceding the head noun or pronoun.	
	To provide descriptive details about the intended referents	

	To describe, clarify, and qualify additional information about scientific phenomena or entities	Kanoksilpatham (2003)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar(s)
Predicative and Attributive Adjectives	To provide the authors with a mean to express their stance	Auria (2008), Charles (2006), Hunston and Thompson (2001), Getkham (2010), Soler (2002), Tutin (2009)
Adverbs	To mark the writers' assessment (attitudes and feelings) of the proposition. To index the writers' attitude and degree of certainty towards the proposition in the clause, its generalizability or its expectedness To indicate some degree or quantity of the quality represented by the verb, adjective or the adverb that they pre-modify. To provide, including focusing, viewpoint, and evaluative.	Baoya (2015), Carter and McCarthy (2006), Hyland (1998), Sack (1971), Skelton (1997), Varttala (1999), Ventola (1997)
That Verb Complements	To facilitate the expression of value assessment of the propositional information and fulfill function of evaluating statement	Baoya, (2015), Getkham (2010), Kanoksilpatham (2003)
Prepositional Phrases	To function as adverbials at clause level, or as postmodifiers of noun phrases or complements of adjectives / adverbs at phrase level	Hasselgard, Lysvag, and Johansson, (2012)
	To pack large amounts of information and are used as a device integrating referential information in a discourse	Baoya (2015), Chafe (as cited in Niko, 1994)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar(s)
Adverbial Subordinators	To show slight and major contrast, give reasons and comparisons and, indicate time relationships, place, and conditions in the research	Baoya (2015)
Participial Clauses	To provide information in an economical way	Biber (2004)
Adverbs	To mark the writers' assessment (attitudes and feelings) of the proposition. To index the writers' attitude and degree of certainty towards the proposition in the clause To indicate some degree or quantity of the quality represented by the verb, adjective or the adverb that they pre-modify To provide, including focusing, viewpoint, and evaluative.	Hyland (1998), Skelton (1997), Varttala (1999), Ventola (1997), Baoya (2015), Sack (1971), Carter and McCarthy (2006)
Split Auxiliaries	To explicate marking of the writers' own persuasion or argumentative discourse designed to persuade the readers	Biber (1995), Quirk et al. (1985)
To Infinitives	To integrate or expand ideas-unit in both written and spoken discourse to introduce an aim, goal, objective, and purpose, to introduce a method, to frame points in a discussion, to introduce a complement and as an adverbial purpose clause	Chafe (as cited in Niko, 1994), Getkham (2010), Kanoksilpatham (2003)

Table 2.5 (Continued)

Lexico-grammatical Feature	Rhetorical Function (s)	Cited Scholar(s)
Word Length	The higher the average word length of text, the higher its informational density	Biber (1995)

	To express that the text is a focus on information (if word length is high)	Kanoksilpatham (2003)
Nouns	To refer to entities or concepts. Nominal elements	Biber et al. (1999)

	To establish what the text is about	

2.2.4 Summary of a Biber's Corpus-based Multidimensional Analysis to Investigate Lexico-grammatical Features in A Corpus Linguistics

Grounded on Biber's (1995, 2004) assumption that some lexico-grammatical features, co-occurring in one dimension, could have some shared communicative functions, Biber (1995) was the first linguist to apply a multidimensional analysis (MA) to his corpus studies. The MA takes a multivariate approach to study language in a corpus. Lexico-grammatical features are tagged and analyzed by a factor analysis to disclose some co-occurring patterns, which are then called dimensions. In a dimension, there are two groups of features. The first group contains positive loading features and the other consists of negative features. The dimension is then interpreted in relation to the shared communicative functions of its composing features. Numerous linguists have applied the Biber's corpus-based multidimensional analysis to analyze co-occurring patterns of lexico-grammatical features in their corpora (Baoya, 2015; Biber, 1995, 2004; Connor & Upton, 2013; Daems, Speelman, & Ruette, 2013; Friginal, 2009; Getkham, 2010; Guinovart, 2000; Kanoksilpatham, 2003). Table 2.6 shows a comparison of the co-occurring patterns and their Lexico grammatical features found in different corpora.

Table 2.6 Summary of the Co-occurring Patterns and their Lexico-grammatical Features Found in Different Corpus

Researcher	Dimension I	Dimension II	Dimension III	Dimension IV	Dimension V	Dimension VI	Dimension VII
Baoya (2015)	**Current Information versus Procedural Concerns,** - Word length - Present tense - Nominalization & gerunds - Attributive adjectives - Phrasal coordination - Past tense	**Evaluative Stances versus Past Actions or States** - Be as main verbs - Predicative adjectives - Pronoun it - Present tense - Pragmatic expressions - Complements - Past tense	**Logical Probability versus Integrated Information** - Dispreferred forms - Modals - Passives - Adverbs - Pronoun it - To-infinitives - Nouns - Prepositional phrases	**Commentary** - Complements - Public verbs - Suasive verbs - Private verbs - Pragmatic expressions	**Personal Engagement versus Modified Information,** - Personal pronouns - To-infinitives - Present tense - Pro-verb do - Relative clauses - Nouns - Participial Clauses	**Unsatisfactory Status Quo versus Research Conduct,** - Present tense - Existenial there - Adverbial clauses - Present tense aspect - Negations - Adverbs - Past tense	**References to Present Research versus Information of the past** - Demonstratives - Prepositional phrases - Independent clause coordination - Past tense - Type/token ratio

Table 2.6 (Continued)

Researcher	Dimension I	Dimension II	Dimension III	Dimension IV
Biber (1995)	**Narrative Versus Non-Narrative Discourse** - Past tense verbs - 3rd person pronouns - Perfect aspect verbs - Public verbs - Synthetic negation - Present participial clauses	**Involved Versus Informational Production** - That-deletions - Contractions - Present tense verbs - 2nd person pronouns - 'Do' as pro-verb - Analytic negation - Demonstrative pronouns - General emphatics - 1st person pronouns - 'It' - 'Be' as main verb - Causative subordination - Discourse particles - Indefinite pronouns	**Situation-Dependent Versus Elaborated Reference** - Time adverbials - Place adverbials - Adverbs - Wh relative clauses in object positions - Pied piping constructions - Wh- relative clauses in subject positions - Phrasal coordination - Nominalizations	**Overt Expression Of Persuasion** - Infinitives - Prediction modals - Suasive verbs - Conditional subordination - Necessity modals - Split auxiliaries - Possibility modals

Table 2.6 (Continued)

Researcher	Dimension I	Dimension II	Dimension III	Dimension IV
Biber (1995)		- General hedges - Amplifiers - Sentence relatives - Wh- questions - Possibility modals - Non-phrasal coordination - Wh-clauses - Final prepositions - Nouns - Word length - Prepositions - TTR - Attributive adjectives		

Table 2.6 (Continued)

Researcher	Dimension I	Dimension II	Dimension III
Biber (2004)	**Narrative-focused discourse**	**Information-focused versus Interactive discourse**	**Stance versus Context-focused discourse**
	- Past tense verbs	- Word length	- That-deletions
	- 3rd person pronouns	- Activity verbs	- Mental verbs
	- Non-factual/communication verb + that-clause	- Contractions	- Factual/mental v.+ that-clause
		- Nominalizations	- Likelihood/mental v. + that-clause
	- Communicative verbs	- 2nd person pronouns	- Likelihood adverbs
	- That-deletions	- 1st person pronouns	- Adverbial clauses
	- Present tense verbs	- Prepositional phrases	- General hedges
		- Abstract nouns	- Factual adverbs
		- Relative clauses	- Nouns
		- Present tense verbs	- Wh-questions
		- Attributive adjectives	
		- Passive v. phrases	
		- Likelihood adverbs	
		- General hedges	

Table 2.6 (Continued)

Researcher	Dimension I	Dimension II	Dimension III	Dimension IV
Connor and Upton (2013)	**Narrative versus Non-narrative concerns** -Past tense verbs -3rd person pron. -Perfect aspect verbs -Public verbs -Synthetic negation -Present participle clauses -Present tense verbs -Attributive adjectives -Past participles -WHIZ deletion -Word length	**Involved versus Informational Production** -Private verbs -That deletion -Contractions -Present tense verbs -2nd person pron. -'Do' as pro-verb -Analytic negation -Demonstrative -Pronouns -General emphatics -1st person pron. -'It' -'Be' as main verbs -Causative -Subordination -Discourse particles -Indefinite pron. -General hedges	**Explicit versus Situation-dependent Ref.** -'Wh' relative clauses on object position -Pied piping constructions -'Wh' relative clauses on subject position -Phrasal coordination -Nominalizations -Time adverbials -Place adverbials -Adverbs	**Overt Expression of Persuasion** -To infinitives -Prediction modals -Suasive verbs -Conditional subordination -Necessity modals -Split auxiliaries

Table 2.6 (Continued)

Researcher	Dimension I	Dimension II	Dimension III	Dimension IV
Connor and Upton (2013)		- Amplifiers - Sentence relatives - 'Wh' questions - Possibility modals - Non-phrasal coordination - 'Wh' clause - Final prepositions - Nouns - Word length - Prepositions - Type token ratio attributive adjectives		
Daems, Speelman, and Ruette (2013)	**Narration vs. Instruction** -3rd person pron. -Past tense verbs -Possessive pron -Adverbs -Particles -Word length -Proper noun	**Formal vs. casual** -Subordinating prepositions and conjunctions -Determiners -Past participles -Wh-determiners -Adjectives	**Diary vs. Background Story** -1st person pron. -Personal pronouns -Nouns	**Reflection vs. Report** -2nd person pron. -3rd person singular -Present tense verbs -Modals -Base form verbs -Wh-adverbs -Wh-pronouns

Table 2.6 (Continued)

Researcher	Dimension I	Dimension II	Dimension III	Dimension IV
Friginal (2009)	**Narrative-focused discourse**	**Addressee –Focused, Polite, and Elaborated Information versus Involved and Simplified Narrative**	**Planned, Procedural Talk**	
	-Past tense verbs	-'It'	-Word count	
	-3rd person pron.	-1st person pron.	-Length of turns	
	-Non-factual /communication	-Past tense verbs	-Type token ratio	
	verbs +that-clause	-'That' deletion	-2nd person pron.	
	-Communicative verbs	-Private v.	-Next/then	
	-That-deletions	-'Wh' clauses	-Word length	
	-Present tense verbs	-Perfect aspect verbs	-Time adverbial	
		-Verb 'Do'	-Prepositions	
		-2nd person pron.	-Please	
		-Word length	-Present tense verbs	
		-Please	-Nominalizations	
		-Nouns	-Because/so	
		-Possibility modals		
		-Nominalizations		
		-Length of turns		
		-Thanks		
		-Ma'am /Sir		

Table 2.6 (Continued)

Researcher	Dimension I	Dimension II	Dimension III	Dimension IV	Dimension V	Dimension VI
Getkham (2010)	**Evaluative Stance**	**Expression of Purposes**	**Framing Claims**	**Conceptual Complexity**	**Expression of Generality**	**Established Knowledge / Expression of Ownership**
	- Suasive verbs - That clause controlled by adjectives - Public verbs - That clause controlled by verbs - That/which relatives - Predicative adjectives - That clause controlled by nouns - Extraposed 'it'	- To infinitives - Coordination - Concessive connectors - Whether/if - Perfect - References - That clause controlled by verbs - Extraposed 'it' - Passives - Pointers	- Private verbs - Hedges - Other connectors - Public verbs - Cause connectors	- Word length - Attributive adjectives - Nouns - Synthetic negation - Participial modifiers	- Present tense verbs - Extraposed 'it' - That clause controlled by nouns - 1st person pron. - Place adverbials - Result connectors - Past tense verbs	- Passives - Coordinating conj. - Nominalization - Whether/if - References - Prepositions - TTR - 1st person pron. - Analytic negation - Amplifiers - Pointers

Table 2.6 (Continued)

Researcher	Dimension I	Dimension II	Dimension III
Guinovart (2000)	**Explicitness Versus Concision**	**Notional Richness Versus Dynamic Deictic Reference**	**Favored Versus Disfavored**
	-Possibility modals -Relatives and interrogatives -Adjectives modified by adverbs -Adjectives /nouns ratio -Amplifiers -Modal auxiliary -Conditional adverbial subordinators -Causative adverbial coordinators -Infinitive forms -Predictive modals -Adverbs	-Hapaxlegomena -Relatives and interrogatives (infinitive forms) -Coordinating conjunctions -Discourse particles -Prepositions nouns ratio -Negative constructions -Adverbs -Interjections -Indefinite pronouns -adverbs prepositions ratio -Personal pronouns -Coleman-liau Index -Word length	-Sentence length in words -Sentence length in characters -Automated readability Index -Reflexive pronouns - Type token ratio

Table 2.6 (Continued)

Researcher	Dimension I	Dimension II	Dimension III
Guinovart (2000)	-Necessity modal	-Attributive adjectives	
	- Type token ratio	-Nouns	
	-Place adverbials	-Prepositions plus nouns	
	-Proper nouns	-Prepositions plus phrases	
		-Adjectives	
		-Proper nouns	
		-Nominal pre-modifiers	
		-Determiners	
		-Past participles	
		-Genitive markers	

Table 2.6 (Continued)

Researcher	Dimension I	Dimension II	Dimension III	Dimension IV	Dimension V	Dimension VI	Dimension VII
Kanoksilpatham (2003)	**Evaluative Stance**	**Expression of Purpose**	**Framing Claims**	**Conceptual versus Specific Reference**	**Attribute Knowledge versus Current Findings**	**Concrete Action versus Abstract Notion**	**Expression of Contradiction**
	- Extraposed 'it' - That clause controlled by adjectives - Predicative - Adjectives - To clause controlled by adjectives	- To infinitives - Whether/if - to clause controlled by verbs - 1st person pronouns - To clause controlled by adjectives - Prepositions - Type token ratio	-Demonstratives -Quantifiers -That clause controlled by verbs	- Word length - Attributive adjectives - Nouns - Numerals - Technical jargon	- Present tense verbs - References - Type token ratio - Common nouns - Past tense verbs - Pointers - Prepositions	- Passives - Coordinating conjunctions - Nominalization - Past tense verbs - Definite articles - Prepositions - Modals	- Concession - Pointers - 'Not' negation - Adverbs

As can be seen in Table 2.6, several scholars applied the Biber's corpus-based multidimensional analysis to investigate co-occurring patterns of lexico-grammatical features in their corpora. The dimensions were mostly named differently. The name given to the dimension is based on the researchers' own interpretation of mutual communicative functions of the co-occurring lexico-grammatical features. For example, in Biber's (2004) dimension I, he interpreted that the past tense verbs, 3rd person pronoun, non-factual / communication verb + that-clause, communicative verbs, that-deletions, and present tense verbs co-occur to perform 'Narrative-focused discourse'. In Daems, Speelman, and Ruette (2013), they interpreted that 2nd person pronouns, 3rd person singular pronouns, present tense verbs, modal verbs, base form verbs, wh-adverbs, and wh-pronouns co-occur to express 'Reflection and Report'.

The next part will show a summary of the lexico-grammatical features found in dimensions (co-occurring patterns) of Baoya's (2015), Getkham's (2010), and Kanoksilpatham's (2003) studies. A reason why the three studies (Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003) were compared is that their corpus are from two opposed academic disciplines (education, applied linguistics, and biochemistry). Similarly, those three and this studies employed Biber's (1995) lexico-grammatical features and the Biber's corpus-based multidimensional analysis as theoretical frameworks. Hence, Baoya's (2015), Getkham's (2010), and Kanoksilpatham's (2003) were compared to investigate any differences or similarities between their studies, making this comparison useful for the discussion. Table 2.7 shows a summary of the co-occurring patterns in which the lexico-grammatical features were found in the works of the three different scholars.

Table 2.7 Summary of the Lexico-grammatical Features Found in Dimension of Each Study

Lexico-grammatical Features	Baoya's (2015)	Getkham's (2010)	Kanoksilpatham's (2003)
Present tense verbs	Current Information versus Procedural Concerns	Expression of Generality	Attribute Knowledge vs. Current Findings
Past tense verbs	Current Information versus Procedural Concerns	Expression of Generality	Attribute Knowledge vs. Current Findings Concrete Action vs. Abstract Notion
Perfect tense verbs	Unsatisfactory Status Quo versus Research Conduct	Expression of Purpose	
Passives	Logical Probability versus Integrated Information	Expression of Purpose Established Knowledge / Expression of Ownership	Concrete Action vs. Abstract Notion
Private verbs	Commentary	Framing Claims	
Public verbs	Commentary	Evaluative Stance Framing Claims	
Suasive verbs	Commentary	Evaluative Stance	
1st person pronouns	Personal Engagements versus Modified Information	Expression of Generality Established Knowledge / Expression of Ownership	Expression of Purpose

Table 2.7 (Continued)

Lexico-grammatical Features	Baoya's (2015)	Getkham's (2010)	Kanoksilpatham's (2003)
2nd person pronouns	Personal Engagements versus Modified Information		
3rd person pronouns	Personal Engagements versus Modified Information		
Extraposed 'it'	Logical Probability versus Integrated Information Evaluative Stance versus Past Actions or States	Evaluative Stance Expression of Purpose Expression of Generality	Evaluative Stance
Demonstrative pronouns	References to Present Research versus Information of the Past		Framing Claims
Hedges	Evaluative Stance versus Past Actions or States	Framing Claims	
Amplifiers	Evaluative Stance versus Past Actions or States	Established Knowledge / Expression of Ownership	
Possibility modals	Evaluative Stance versus Past Actions or States		Concrete Action versus Abstract Notion

Table 2.7 (Continued)

Lexico-grammatical Features	Baoya's (2015)	Getkham's (2010)	Kanoksilpatham's (2003)
Prediction modals	Evaluative Stance versus Past Actions or States		Concrete Action versus Abstract Notion
Necessity modals	Evaluative Stance versus Past Actions or States		Concrete Action versus Abstract Notion
Amplifiers	Evaluative Stance versus Past Actions or States	Established Knowledge / Expression of Ownership	
Synthetic negation	Unsatisfactory Status Quo versus Research Conduct	Conceptual Complexity	
Analytic negation	Unsatisfactory Status Quo versus Research Conduct	Established Knowledge / Expression of Ownership	Expression of Contradiction
'Be' as main verb	Evaluative Stance versus Past Actions or States		
'Do' as pro-verb	Personal engagements versus modified information		
Emphatics	Evaluative Stance versus Past Actions or States		

Table 2.7 (Continued)

Lexico-grammatical Features	Baoya's (2015)	Getkham's (2010)	Kanoksilpatham's (2003)
Causative subordination			involved versus informational production
Relative clauses	Personal Engagements versus Modified Information		
Wh- clauses	Personal Engagements versus Modified Information		
Wh relative clauses in object positions	Personal Engagements versus Modified Information		
Wh- relative clauses in subject positions	Personal Engagements versus Modified Information		
That/which relatives	Personal Engagements versus Modified Information	Evaluative Stance	
That clause controlled by adjectives.	Personal Engagements versus Modified Information	Evaluative Stance	Evaluative Stance
That clause controlled by verbs	Personal Engagements versus Modified Information	Evaluative Stance Expression of Purpose	Framing Claims

Table 2.7 (Continued)

Lexico-grammatical Features	Baoya's (2015)	Getkham's (2010)	Kanoksilpatham's (2003)
That clause controlled by nouns	Personal Engagements versus Modified Information	Evaluative Stance Expression of Generality	
That-deletions	Personal Engagements versus Modified Information		
Coordinating conjunctions		Established Knowledge / Expression of Ownership	Concrete Action versus Abstract Notion
Sentence relatives	Personal Engagements versus Modified Information	Evaluative Stance	
Wh- questions	Personal Engagements versus Modified Information		
Final prepositions	Commentary References to Present Research versus Information of the Past		
Adverbs	Logical Probability versus Integrated Information		Expression of Contradiction
Place adverbials	Logical Probability versus Integrated Information	Expression Generality	

Table 2.7 (Continued)

Lexico-grammatical Features	Baoya's (2015)	Getkham's (2010)	Kanoksilpatham's (2003)
Time adverbials	Logical Probability versus Integrated Information		
Nouns	Personal Engagements versus Modified Information	Conceptual Complexity	Conceptual versus Specific Reference
Abstract nouns	Personal Engagements versus Modified Information		
Common nouns	Personal Engagements versus Modified Information		Attribute Knowledge versus Current Findings
Word length	Current Information versus Procedural Concerns	Conceptual Complexity	Conceptual versus Specific Reference
Type / token ratio	References to Present Research versus Information of the Past	Established Knowledge / Expression of Ownership	Expression of Purpose Attribute Knowledge versus. Current Findings\
Prepositions	References to Present Research versus Information of the Past Logical Probability versus Integrated Information	Established Knowledge / Expression of Ownership	Concrete Action versus Abstract Notion Expression of Purpose Attribute Knowledge versus Current Findings

Table 2.7 (Continued)

Lexico-grammatical Features	Baoya's (2015)	Getkham's (2010)	Kanoksilpatham's (2003)
Predicative adjectives	Evaluative Stance versus Past Actions or States	Evaluative Stance	Evaluative Stance
Attributive adjectives	Evaluative Stance versus Past Actions or States	Conceptual Complexity	Conceptual versus Specific Reference
To infinitives	Personal Engagements versus Modified Information Logical Probability versus Integrated Information	Expression of Purpose	Expression of Purpose
To clause controlled by adjectives.			Evaluative Stance Expression of Purpose
To clause controlled by verbs			Expression of Purpose
Whether / if		Expression of Purpose Established Knowledge / Expression of Ownership	Expression of Purpose

Table 2.7 (Continued)

Lexico-grammatical Features	Baoya's (2015)	Getkham's (2010)	Kanoksilpatham's (2003)
Coordination	References to Present Research versus Information of the Past	Expression of Purpose	
Concessive connectors		Expression of Purpose	Expression of Contradiction
References		Expression of Purpose Established Knowledge / Expression of Ownership	Attribute Knowledge versus Current Findings
Pointers		Expression of Purpose Established Knowledge / Expression of Ownership	Attribute Knowledge versus Current Findings Expression of Contradiction
Quantifiers			Framing Claims
Other connectors		Framing Claims	
Cause connectors		Framing Claims	
Result connectors		Expression of Generality	
Numerals			Conceptual versus Specific Reference
Technical jargon			Conceptual versus Specific Reference
Participial modifiers		Conceptual Complexity	

Table 2.7 (Continued)

Lexico-grammatical Features	Baoya's (2015)	Getkham's (2010)	Kanoksilpatham's (2003)
Nominalization	Current Information versus Procedural Concerns	Established Knowledge / Expression of Ownership	Concrete Action versus Abstract Notion
Definite articles			Concrete Action versus Abstract Notion
Prepositional phrases	Logical Probability versus Integrated Information References to Present Research versus Information of the Past		

As can be seen from Table 2.7, each lexico-grammatical feature loading in the dimensions of Baoya's (2015), Getkham's (2010), and Kanoksilpatham's (2003) studies can perform different communicative functions depending on other lexico-grammatical features it co-occurs.

2.3 Summary

The gaps in previous literature on the research article genre and the need of assistance for non-native English and novice nursing and language teaching researchers in writing publishable research articles suggest that it would be beneficial to conduct a comprehensive investigation into the nursing and language teaching research articles. The research problem is approached from perspectives of genre analysis and corpus linguistics. The major goal is to attempt to map out co-occurring patterns of lexico-grammatical features associated with the communicative purpose of each conventional section in nursing and language teaching research articles.

This chapter examined the theories informing the present study, including theoretical concepts of the research article, Biber's corpus based multidimensional analysis, and lexico-grammatical features. While the review of relevant theories highlighted the advantage of a corpus approach to genre analysis, the examination of previous research helps pinpoint some limitations of research on the research articles that need to be addressed. The review culminated in a conclusion that mixed methods inquiry into nursing and language teaching research article would make a useful contribution to ESP / EAP research and practice. Those are summarized views of what was utilized as the framework for this dissertation. Figure 2.3 pictures the conceptual map of this study.

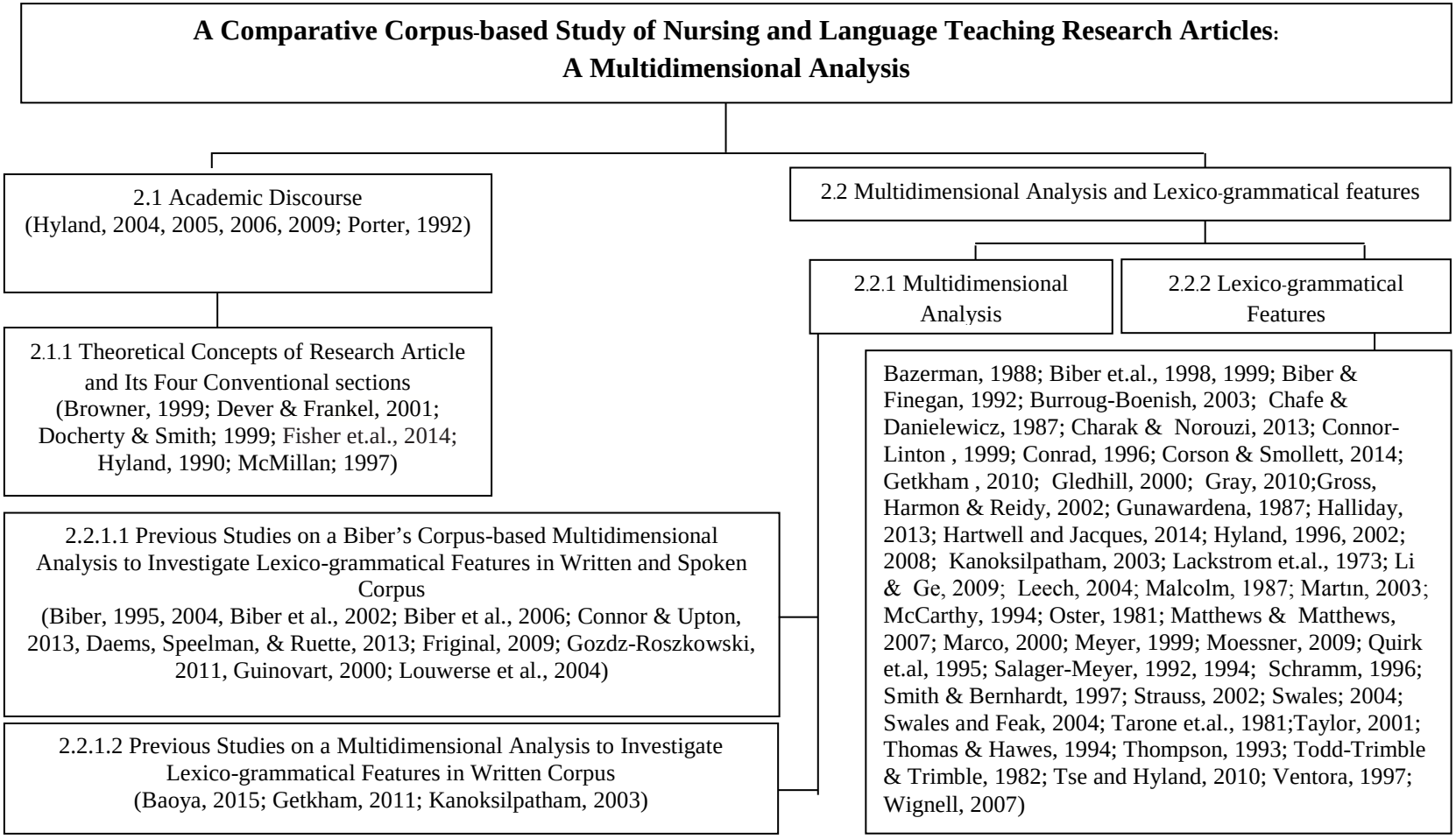

Figure 2.3 Conceptual Map of the Review of Literature

CHAPTER 3

RESEARCH METHODOLOGY

Chapter III presents the research methodology of the study. This chapter consists of three sections: research design, data collection, and data analysis.

3.1 Research Design

This study employed the Biber's corpus-based multidimensional analysis (1995) to investigate, analyze, and compare co-occurring patterns of lexico-grammatical features in Nursing Research Article Corpus (NURAC) and Language Teaching Research Article Corpus (LTRAC). Biber (1995) is the first who employed multivariate statistical techniques to investigate register variation in languages. And then he named his approach as a corpus-based multidimensional analysis. Biber's corpus-based approach has been acknowledged by several researchers (Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003). An advantage of the approach, enhancing the validity of research results, is that it constitutes a holistic and rich account of the phenomenon (Scott & Morrison, 2005). Figure 3.1 describes the components of the research design and the procedures involved in this study.

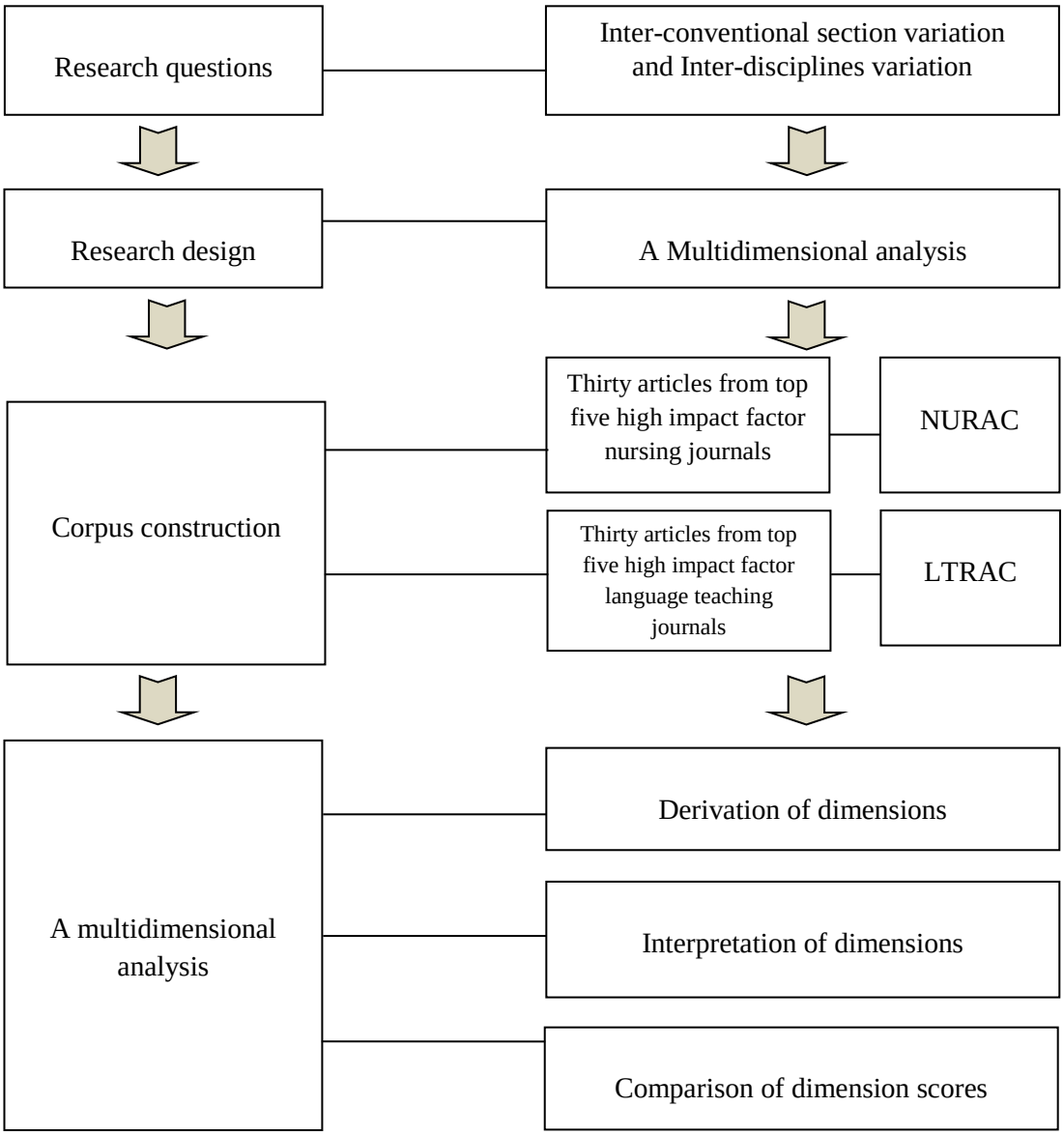

Figure 3.1 Research Design

3.2 Data Collection

3.2.1 The Corpora

Nursing Research Article Corpus (NURAC) and Language Teaching Research Article Corpus (LTRAC) were generated to investigate co-occurring patterns of lexico-grammatical features. The choice of the research articles from the two disciplines as the target source for this study was inspired by their proliferation of research studies and the pedagogical needs to assist novice and the non-native

researchers (particularly at Suan Dusit University) to write publishable research articles.

In the past, consideration of sample size has been arbitrary and subjective since it is impossible to determine the minimum size of a corpus. In previous corpus-based studies, corpora ranged from ten articles to sixty articles (Brett, 1994; Samraj, 2002). An adequate size of a corpus should be four times as many as the numbers of lexico-grammatical features to be investigated (Flowerdew, 2011). That means if a broad range of lexico-grammatical features are investigated, a much larger corpus is needed. This is because, while common features have high frequencies of occurrence, some relatively rare features require a larger amount of text to provide sufficient information on them. Also, there should be at least more than 300,000 running words in the corpus for effective investigation (Kanoksilpatham, 2003). In this study, forty eight lexico-grammatical features were investigated. That means the grand corpus should contain at least 172 text files.

In Nursing Research Article Corpus (NURAC), thirty research articles were systematically selected (six articles from the top five nursing journals). Also, in Language Teaching Research Article Corpus (LTRAC), thirty research articles (six articles from top five language teaching journals) were systemically selected. Each article was then divided into four text files (Introduction, Methods, Results, and Discussion files). Hence, there were 120 text files in each corpus. In total, NURAC and LTRAC comprised 240 text files. In other words, the total number of 240 text files came from:

30 (nursing RAs) x 4 (conventional sections) = 120 (files)

+

30 (language teaching RAs) x 4 (conventional sections) = 120 (files)

240 (files)

NURAC comprised 101,967 running words while LTRAC consisted of 228,891 running words. Altogether, the whole corpus contained 330,858 running words which were larger than the recommended 300,000 running word size.

According to scholars' recommendation (Baoya, 2015; Brett, 1994; Flowerdew, 2004; Getkham, 2010; Henry & Roseberry, 1999; Kanoksilpatham, 2003; Samraj, 2002), the sixty articles, 240 text files and 330,858 running words would confirm the validity of the corpus and were large enough for effective investigation.

The following section describes the criteria and procedures for selecting journals and articles for the NURAC and LTRAC which served as primary data source for the study.

3.2.1.1 Selection of the Journals

Selection of journals was based on the ranking of journals in SCImaco Journal Rank 2014. Several statistical measures (total cites, impact factor, cited half-life, index, and total articles) are applied for the ranking. SCImaco Journal Rank 2014 ascertains all selected journals are from the world's leading journals. It can be assumed that the higher the impact factors the journal receives, the more acceptable quality it has (Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003; Wu, 2011a).

According to SCImaco Journal Rank 2014 without considering whether a journal is qualitative or qualitative oriented journal, the top five nursing journals (Diabetes Care, American Journal of Clinical Nutrition, Stroke, Journal of Cancer Survivorship, and Pediatric Obesity) and the top five language teaching journals (Journal of Second Language Writing, Language Learning, English for Specific Purposes, Studies in Second Language Acquisition, and Reading and Writing) were selected. Though some scholars do not consider Studies in Second Language Acquisition to be in a group of language teaching journals, this study applied a framework created by Scimago Journal Rank 2014 showing that Studies in Second Language Acquisition is also considered a language teaching journal. Thus, the articles were selected from these journals. Table 3.1 summarizes the selected top five journals from both disciplines and their details.

Table 3.1 Summary of the Top Five Nursing and Language Teaching Journals Included in the Corpus

Corpus		Journal	SCImaco Journal Rank Indicator	Frequency
	1	Diabetes Care	4.190	12 issues / year
	2	American Journal of Clinical Nutrition	3.247	12 issues / year
NURAC	3	Stroke	3.152	12 issues / year
	4	World Psychiatry	2.875	3 issues / year
	5	Pediatric Obesity	2.061	6 issues / year
	1	Journal of Second Language Writing	2.489	4 issues / year
	2	Language Learning	1.790	4 issues / year
LTRAC	3	English for Specific Purposes	1.533	4 issues / year
	4	Studies in Second Language Acquisition	1.515	4 issues / year
	5	Reading and Writing	1.341	9 issues / year

As shown in Table 3.1 above, these top five nursing and language teaching journals vary in terms of their frequency of publications. The next part provided further specifications regarding how articles from these journals were selected.

3.2.1.2 Selection of the Articles

The articles that meet the following criteria were selected.

1) Any research articles with identical lists of authors were excluded.

2) Any research articles with a length of less than two thousand words were excluded since those articles would not be large enough to be investigated.

3) Any research articles with non-IMRD structure were excluded. Following scholars (Holmes, 1997; Pho, 2008; Sollaci & Pereira, 2004), an article with IMRD structure is the article with clearly printed headings - Introduction, Methods, Results, and Discussion, or other synonyms. However, the introduction

section has to be present but not necessarily accompanied by a heading. Articles that did not follow this structure were considered non-IMRD and not investigated.

However, it should be noted that no efforts were made to check whether the authors of the articles are native or non-native English speakers. This is because this study does not take native language status as a variable. Another reason is that there is no reliable way to do so, where by simply looking at an author's name and institutional affiliation as some researchers have done would not be a reliable method. Most importantly, all articles published in the top five leading international journals of each discipline had undergone a rigorous peer review, proof-reading, and editorial process and were therefore assumed a representative sample of expert writing (Lee & Chen, 2009).

3.2.1.3 The Four Internal Conventional Sections of Research Articles

Since heading sections of some research articles were sometimes differently labeled, this section describes a phase of study identifying the conventional sections of the sixty research articles in NURAC and LTRAC.

1) The Conventional Sections

Most research articles fundamentally comprise four conventional sections (Swales, 2004). The sections are generally identified by the explicit headings - Introduction, Methods, Results, and Discussion (Baoya, 2015, Getkham, 2010; Kanoksilpatham, 2003). However, the headings sometimes apply synonyms or are not even labeled. The researcher of this dissertation found that across the thirty articles in NURAC, instead of ‘Methods’, ‘Research Design and Methods’ was applied in all articles from Diabetes Care, ‘Subject and Method’ was applied in all articles from American Journal of Clinical Nutrition, there was no Introduction labeled in articles from World Psychiatry. Moreover, two articles from Pediatric Obesity applied ‘Background’ instead of ‘Introduction’ and ‘Material and Method’ instead of ‘Method’.

In LTRAC, three articles from Study in Language Acquisition applied ‘Background’ instead of ‘Introduction’. ‘Methodology’ was used in one article from Journal of Second Language Writing instead of ‘Method’, ‘Research Design’ and ‘Overall Method’ were used in two articles from Language Learning. ‘Methods of Data Collection and Analysis’, ‘Research Questions and Methods’,

‘Methods and Analysis’, ‘Material and Methods’, and ‘Data and Methodology’ were used in the six articles from English for Specific Purposes, and ‘The Research Study’ was used in one article from Study in Language Acquisition. Instead of Results, ‘Findings’ was applied in an article from Journal of Second Language Writing and another one from English for Specific Purposes. ‘Analysis and Findings’ and ‘Explicit Knowledge and Results’ were applied in the two articles from Language Learning, and ‘Main Results’ and ‘Analysis and Results’ were used in the two articles from English for Specific Purposes. Instead of ‘Discussion’, ‘General Discussion’ and ‘Discussion of Explicit Knowledge’ were used in the two articles from Language Learning.

2) Reliability Check of RA Conventional Section

Identification of research article conventional sections was necessary to ensure reliability. When human coders are used, reliability translates into intercoder reliability (Neuendorf, 2002). Intercoder reliability has become a critical component of identifying research article conventional section where it refers to the extent of agreement between each independent coder’s assignments of all semantic functional units in the texts to sections.

Cargil and O’Connor (2009) stated that although the section headings may not be similarly labeled, the same types of information are contained under the conventional IMRD headings in an article. However, to avoid subjectivity in interpreting the synonyms of section heading, four experienced internationally published researchers, as coders, were asked to help validate an analysis of the headings of research article conventional sections.

The four intercoders underwent hands-on training. Firstly, the researcher explained the notion of identification of a research article’s conventional section and guidelines for section identification. After the orientation phase, the four intercoders coded thirty articles together (15 from NURAC and 15 from LTRAC, 3 from each journal). During the process, the researcher monitored the intercoders’ reliability. This process familiarized the intercoders with the methods of section identification. Then, the four intercoders independently coded the other thirty articles from the NURAC and LTRAC (the other 50% of the corpora, three from each). The intercoders’ reliability was assessed by comparing the intercoders’ results. The

acceptable intercoder percentage agreement on section boundaries and labels assigned should be more than 75% to indicate a satisfactory level of intercoders' reliability (Neuendorf, 2002). It was believed that the higher percentage agreement of intercoders' reliability, the more the research article conventional section identification is valid. After that, a discussion was held to resolve the identified discrepancies between the four intercoders until 100% agreement was reached (see Appendix B). Tables 3.2 summarizes the organizations of the article in NURAC and LTRAC

Table 3.2 Organization of the Articles in NURAC and LTRAC

Corpus	Journal (Article)	Organization			
		I	**M**	**R**	**D**
NURAC	1) Diabetes Care (T01-06)	✓	✓	✓	✓
	2) American Journal of Clinical Nutrition (T07-12)	✓	✓	✓	✓
	3) Stroke (T13-18)	✓	✓	✓	✓
	4) World Psychiatry (T19-24)	✓	✓	✓	✓
	5) Pediatric Obesity (T25-30)	✓	✓	✓	✓
LTRAC	1) Journal of Second Language Writing (T31-36)	✓	✓	✓	✓
	2) Language Learning (T37-42)	✓	✓	✓	✓
	3) English for Specific Purposes (T43-48)	✓	✓	✓	✓
	4) Study in Language Acquisition (T49-54)	✓	✓	✓	✓
	5) Reading and Writing (T55-60)	✓	✓	✓	✓

Note: (I) refers to Introduction section (M) refers to Methods section
(R) refers to Results section (D) refers to Discussion section

As shown in Table 3.2, after hand-coding and a group discussion, the four basic conventional sections were found in these sixty articles.

3.2.1.4 Corpus Annotation

'Annotation' is a process of adding such interpretative, linguistic information to an electronic corpus (Leech, 1997). It adds new information which can

be sorted, counted, and compared. This process includes text editing and lexico-grammatical tagging.

1) Text Editing

All selected research articles were converted to and saved as text files (.txt). Several adjustments were made to the saved texts to promote consistency in the counts of lexico-grammatical features. This important step involved: i) removing all uninvestigated irrelevant sections such as titles, abstracts, key words, affiliations, bibliographies, footnotes, acknowledgments, graphics, tables, figures, page numbers, and examples, ii) deleting empty lines, redundant spaces, hard carriage returns, etc., as they are likely to cause tagging errors which might in turn lead to inaccurate analysis, iii) unifying spelling to ensure that the same words are spelt the same consistently to avoid errors in word frequency counts, iv) removing mathematical formulas and foreign characters with the codes as they might cause tagging errors, and v) deleting extended quotes by participants in the results section. These quotes, normally colloquial in style and often extended in length, do not reflect the authors' language, which was the very target of investigation in this study.

2) Lexico-grammatical Tagging

This process was performed by Multidimensional Analysis Tagger (MAT 1.3) (Nini, 2015). The major reason why the MAT 1.3 was used is that Biber's tagger is not available since it is reserved for a small group of linguists and the MAT 1.3 provides similar functions as the Biber Tagger (Nini, 2015). On the contrary, it has several advantages, such as its ability to download without any charges, and it helps reduce time for annotating words in the corpus. It also provides necessary descriptive statistics and helps normalize frequencies of the lexico-grammatical features. Alternatively, from other downloadable taggers such as Stanford or PENN Treebank, the MAT 1.3 is also able to annotate more accurate and more specific lexical, grammatical, syntactical, and pragmatic functions of words. For example, negations and prepositions are distinguished from general adverbs and general subordinators. The word 'to' as an infinitive marker is disambiguated from the word 'to' as a preposition. Three tags are further added in order to facilitate the identification of Biber's (1995) 67 linguistic features - indefinite pronouns, quantifiers, and quantifier pronouns.

3.2.1.5 Corpus Arrangement

The two corpora served as an input for further linguistic analysis of multidimensional analysis. The composition of the corpora compiled for multidimensional analysis is summarized in Table 3.3.

Table 3.3 Number of Running Words in Each Conventional Section in the Articles

Nursing Research Article Corpus (NURAC)					
Research Article	**Corpus Size (Words)**				
	I	**M**	**R**	**D**	**Total Size (Words)**
T1	608	979	464	1216	3,267
T2	384	1911	863	977	4,135
T3	380	1229	937	1679	4,225
T4	384	1481	547	1693	4,105
T5	200	779	577	969	2,525
T6	316	2010	169	876	3,371
T7	468	1747	1413	1548	5,176
T8	438	1197	1112	1279	4,026
T9	357	1024	638	1237	3,256
T10	325	650	757	669	2,401
T11	488	1012	821	1029	3,350
T12	590	1757	806	1001	4,154
T13	146	1222	406	518	2,292
T14	275	942	559	1131	2,907
T15	221	605	733	1488	3,047
T16	290	1202	921	929	3,342
T17	206	542	468	978	2,194
T18	287	647	1212	861	3,007
T19	696	793	1426	1437	4,352
T20	377	640	544	1481	3,042
T21	437	826	508	767	2,538
T22	1,490	1971	865	1782	6,108
T23	444	1035	1127	1051	3,657

Table 3.3 (Continued)

Nursing Research Article Corpus (NURAC)					
Research Article	**Corpus Size (Words)**				
	I	**M**	**R**	**D**	**Total Size (Words)**
T24	674	1423	747	836	3,680
T25	354	1357	858	1020	3,589
T26	326	757	725	994	2,802
T27	393	827	549	953	2,722
T28	522	572	441	839	2,374
T29	480	1216	441	1023	3,160
T30	387	799	939	1038	3,163
Total size	12,943	33,152	22,573	33,299	101,967
(%)	12.69	32.51	22.14	32.66	100
Maximum	1,490	2,010	1,426	1,782	6,108
Minimum	146	542	169	518	2,194
SD	240.50	437.12	299.40	313.35	873.36

Note: (I) refers to Introduction section (M) refers to Methods section
(R) refers to Results section (D) refers to Discussion section

Table 3.3 shows that each section varied in its number of words. The NURAC consisted of 101,967 running words. The Introduction contained 12,943 words; the Methods contained 33,152 words; the Results contained 22,573 words; and, with the largest number of words, the Discussion contained 33,299 words. The second largest number of words was in the Methods. The third largest number of words was in the Results, and the fewest number of words was in the Introduction. The percentages of the word count in the nursing research article corpus were 32.66, 32.51, 22.14, and 12.69 respectively.

The LTRAC consisted of 228,891 running words. The Introduction contained 68,753 words, the Methods contained 47,924 words, the Results contained 61,110 words, and the Discussion contained 51,734 words. The largest number of

words was in the Introduction, the second and third largest number of words were in the Results and the Discussion, and the smallest number of words was in the Methods. The percentages of word count per section in the language teaching research article corpus were 30.04, 26.70, 22.60 and 20.66 respectively.

Thereafter, the databases of the two corpora undergo the subsequent stage of tagging by Multidimensional Analysis Tagger (MAT 1.3).

3.2.1.6 Overview of NURAC and LTRAC

NURAC consisted of two sub-folders (NURAC_1 and NURAC_2). NURAC_1 folder contained thirty authentic articles from top five journals from the discipline. The articles were appointed with ‘T’ followed by an ordinal number. They were T1-T30 (see Appendix A). Each ‘T’ file was again divided into four further files based on the section the text was taken from (for example T1_intro, T1_method, T1_result, and T1_ discuss). For example, the ‘T1_method’ refers to the Method section of Text1. NURAC_2 contained the version of the thirty tagged articles.

LTRAC also comprised of two sub-folders (LTRAC_1 and LTRAC_2). LTRAC_1 contained thirty authentic language teaching research articles (see Appendix A). The articles in LTRAC were appointed with ‘T’ followed by an ordinal number (31-60). Moreover, each ‘T’ file was again divided into four smaller files based on the section the text was taken from. LTRAC_2 was the version of the thirty tagged articles.

To facilitate data retrieval for the different research objectives, text files were placed in folders which in turn are placed in sub-folders representing different tiers. The folders and files are named to enable intuitive recognition as well as easy manipulation when necessary. Figure 3.2 pictures the four folders in NURAC and LTRAC

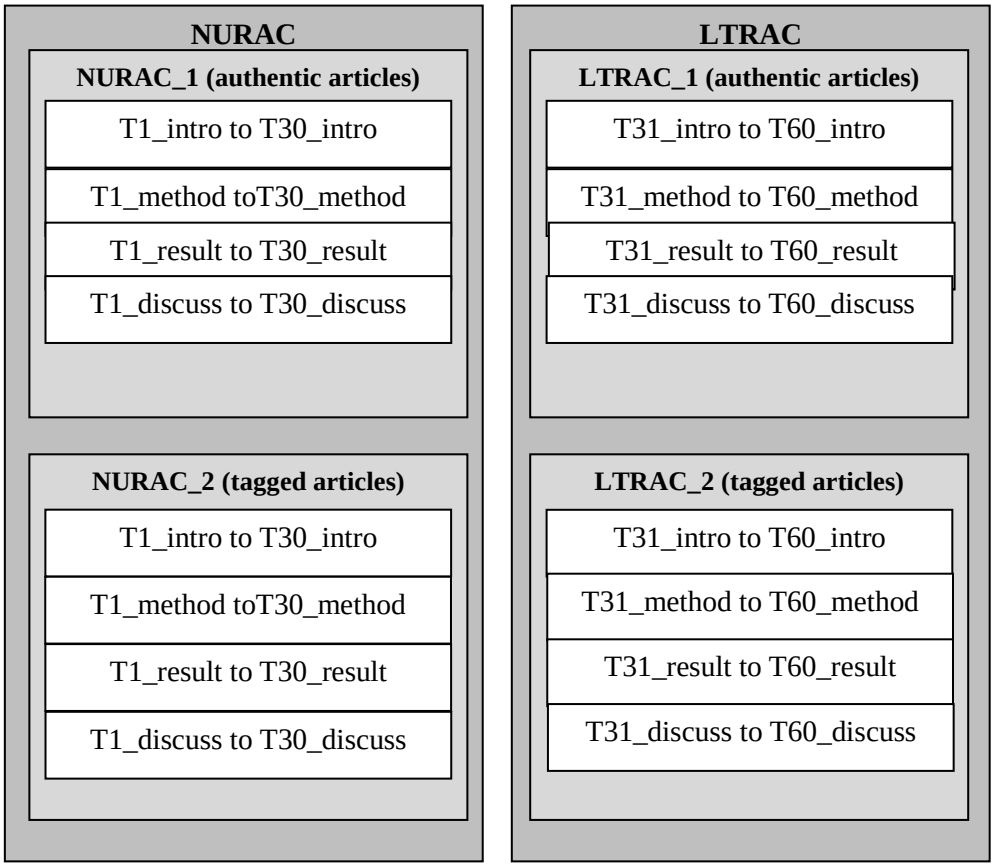

Figure 3.2 The Four Folders in NURAC and LTRAC

3.3 Data Analysis

Several procedures were utilized to analyze the data. The following explanations describe the analysis in relation to each research question.

3.3.1 Research Question 1: What are the co-occurring patterns of lexico-grammatical features in Nursing Research Article Corpus (NURAC) and Language Teaching Research Article Corpus (LTRAC)?

For this question, the Biber's multidimensional analysis (1995) was employed to investigate co-occurring patterns of Biber's lexico-grammatical features (1995) in NURAC and LTRAC (see Appendix C for a list of the features with their operational definitions). These features represent different lexical and grammatical categories (e.g. verbs, adjectives, pronouns, past tense, present perfect aspect, passive voice,

relative clauses, adverbial clauses, complement clause types, public verbs, suasive verbs, hedges, downtoners, etc.). The approach relied on different computational tools to tag, to retrieve, and to tally lexico-grammatical features. The articles were tagged for various grammatical categories, lexical classes, and syntactic constructions.

To check the accuracy of the tagging, four different research article conventional sections from different journals were randomly sampled. The researcher, with one linguistic specialist, together checked the tagging manually and compared the tagging results of MAT 1.3. The automatic tagging proved to be more than 97.67% accurate with no systematic tagging errors (see Appendix D: the Results of Accuracy Checks of Tagging). Subsequently, the frequencies of these features were counted and normalized.

Like Biber (1995) and other previous studies (e.g. Baoya, 2015; Biber, 1995; Getkham, 2011; Kanoksilapatham, 2003), this study normalized the frequencies of all lexico-grammatical features to a hundred words. When text length is varied as in this study, the frequencies should be normalized. In this study, normalization refers to adjusting raw lexico-grammatical frequencies, counted from articles, with different word length to notionally common scale (Biber, 1995). That is, the frequencies of the features were normalized to bring all variables into proportion with one another. This process was done by dividing the raw frequency scores of each feature in each observation by the length of that text and multiplying the product by 100.

$$\frac{\text{The frequency of a lexico-grammatical feature in an article}}{\text{The total number of words in the article}} \quad X \quad 100$$

However, the results of frequency counts indicated that some features had too many zero frequencies across the corpus, meaning that some features had rarely been used in the corpus. Therefore, this treatment reduced the original set of variables to forty-eight, still representing the original sixty-seven lexico-grammatical features. A list of forty-eight variables applied in this study is provided in the Tables 3.4 and 3.5. The frequencies of these forty-eight lexico-grammatical features provided a basis for all subsequent procedural steps of multidimensional analysis to be described in the remainder of this chapter.

Table 3.4 List of the 48 Aggregated Lexico-grammatical Features and Their Normalized Frequencies of Use in NURAC

Lexico-grammatical Feature	Max	Min	X	SD	Range
1) Type / Token Ratio (TTR)	249	106	193.10	28.98	143
2) Total Other Nouns (NN)	43.40	19.40	29.26	4.42	24.0
3) Total Prepositional Phrases (PIN)	16.25	7.51	12.57	1.82	8.74
4) Attributive Adjectives (JJ)	21.23	5.37	11.13	2.65	15.86
5) Average Word Length (AWL)	6.29	4.66	5.46	0.36	1.63
6) Nominalizations (NOMZ)	9.48	0.56	4.39	1.68	8.92
7) Past Tense (VBD)	6.60	0	3.45	1.79	6.6
8) Present Tense (VPRT)	6.33	0	2.13	1.53	6.33
9) Total Adverbs (RB)	4.73	0.53	1.94	0.86	4.2
10) Agentless Passives (PASS)	4.51	0.25	1.75	0.95	4.26
11) Phrasal Coordinations (PHC)	2.73	0	1.13	0.57	2.73
12) Be as Main Verbs (BEMA)	2.96	0	1.08	0.66	2.96
13) Private Verbs (PRIV)	2.96	0	1.03	0.51	2.96
14) Independent Clause Coordination (ANDC)	2.97	0	1.02	0.53	2.97
15) Place Adverbials (PLACE)	0.69	0	0.96	0.14	0.69
16) Infinitives (TO)	2.91	0	0.93	0.60	2.91
17) Demonstratives (DEMO)	2.10	0	0.73	0.50	2.10
18) Predicative Adjectives (PRED)	1.86	0	0.65	0.44	1.86
19) Gerunds (GER)	2.55	0	0.61	0.54	2.55
20) Conjuncts (CONJ)	1.94	0	0.61	0.45	1.94
21) First Person Pronouns (FPP1)	2.69	0	0.55	0.53	2.69
22) Public Verbs (PUBV)	2.10	0	0.44	0.42	2.10
23) Perfect Aspects (PEAS)	2.78	0	0.43	0.49	2.78
24) Possibility Modal (POMD)	2.29	0	0.43	0.52	2.29
25) Analytic Negations (XXO)	1.43	0	0.41	0.30	1.43
26) Past Participial WHIZ Deletion Relatives (WZPAST)	1.37	0	0.38	0.29	1.37
27) Split Auxiliaries (SPAU)	1.11	0	0.34	0.28	1.1
28) Present Participial WHIZ Deletion Relatives (WZPRES)	1.09	0	0.33	0.26	1.09

Table 3.4 (Continued)

Lexico-grammatical Feature	Max	Min	X	SD	Range
29) That Verb Complements (THVC)	1.49	0	0.30	0.34	1.49
30) Suasive Verbs (SUAV)	1.37	0	0.28	0.29	1.37
31) Time Adverbials (TIME)	1.81	0	0.27	0.32	1.81
32) Emphatics (EMPH)	1.77	0	0.26	0.30	1.77
33) Demonstrative Pronouns (DEMP)	1.72	0	0.24	0.28	1.72
34) Third Person Pronouns (TPP3)	1.88	0	0.22	0.32	1.88
35) By-Passives (BYPA)	1.17	0	0.20	0.25	1.17
36) Downtoners (DWNT)	3.22	0	0.19	0.35	3.22
37) Pronoun It (PIT)	0.85	0	0.19	0.22	0.85
38) That Relative Clauses on Subject Position (TSUB)	1.04	0	0.14	0.18	1.04
39) Synthetic Negations (SYNE)	1.04	0	0.14	0.20	1.04
40) Sentence Relatives (SERE)	1.04	0	0.14	0.20	1.04
41) Present Participial Clauses (PRESP)	0.74	0	0.13	0.17	0.74
42) Wh Relative Clauses on Subject Positions (WHSUB)	1.26	0	0.13	0.22	1.26
43) Existential There (EX)	0.78	0	0.12	0.19	0.78
44) Other Adverbial Subordinators (OSUB)	0.91	0	0.10	0.16	0.91
45) Causative Adverbial Subordinators (CAUS)	0.70	0	0.10	0.16	0.70
46) Predictive Modals (PRMD)	1.13	0	0.10	0.17	1.13
47) That Deletion (THATD)	0.70	0	0.06	0.11	0.70
48) Pire-piping Relative Clauses (PIRE)	0.39	0	0.05	0.09	0.39

Table 3.4 displays descriptive statistics of the forty-eight aggregated features in the remaining 120 section texts of NURAC in descending order of means. The frequencies were also normalized to per a hundred words. The normalized mean ranged from 193.10 to 0.05, all of which also indicated great differences in their use. The standard deviations ranged from 28.98 to 0.09, reflecting different amounts of variation within the features.

Table 3.5 List of the 48 Aggregated Lexico-grammatical Features and Their Normalized Frequencies of Use in LTRAC

Lexico-grammatical Feature	Max	Min	X	SD	Range
1) Type / Token Ratio (TTR)	239	147	196.50	21.10	92
2) Total Other Nouns (NN)	34.55	18.21	26.36	3.14	16.34
3) Total Prepositional Phrases (PIN)	14.82	8.17	11.85	1.30	6.65
4) Attributive Adjectives (JJ)	14.07	3.43	8.60	2.09	10.64
5) Average Word Length (AWL)	5.95	3.86	5.24	0.35	2.09
6) Nominalizations (NOMZ)	7.67	1.20	3.90	3.14	16.34
7) Past Tense (VBD)	6.71	0.35	3.24	1.71	6.36
8) Present Tense (VPRT)	6.48	0.47	3.17	1.40	6.01
9) Total Adverbs (RB)	4.63	0.41	2.36	0.75	4.22
10) Private Verbs (PRIV)	4.84	0.21	1.50	0.63	4.63
11) Agentless Passives (PASS)	3.97	0.19	1.37	0.75	3.78
12) Gerunds (GER)	5.36	0	1.36	0.99	5.36
13) Infinitives (TO)	4.37	0	1.33	0.63	4.37
14) Be as Main Verbs (BEMA)	2.69	0.39	1.17	0.47	2.3
15) Third Person Pronouns (TPP3)	5.44	0	1.04	0.93	5.44
16) Phrasal Coordinations (PHC)	2.32	0.17	1.01	0.44	2.15
17) Demonstratives (DEMO)	2.04	0.08	0.92	0.38	1.96
18) Conjuncts (CONJ)	2.05	0.08	0.90	0.43	1.97
19) Independent Clause Coordination (ANDC)	1.97	0.13	0.87	0.36	1.84
20) Public Verbs (PUBV)	2.10	0	0.75	0.50	2.10
21) Predicative Adjectives (PRED)	1.97	0	0.69	0.38	1.97
22) First Person Pronouns (FPP1)	5.01	0	0.58	0.75	5.01
23) Possibility Modal (POMD)	2.04	0	0.48	0.39	2.04
24) Analytic Negations (XXO)	1.72	0	0.47	0.30	1.72
25) Emphatics (EMPH)	1.67	0	0.47	0.32	1.67
26) That Verb Complements (THVC)	1.60	0	0.42	0.28	1.6
27) Suasive Verbs (SUAV)	2.10	0	0.42	0.30	2.1
28) Pronoun It (PIT)	1.21	0	0.37	0.28	1.21
29) Past Participial WHIZ Deletion Relatives (WZPAST)	0.94	0	0.36	0.19	0.94

Table 3.5 (Continued)

Lexico-grammatical Feature	Max	Min	X	SD	Range
30) Present Participial WHIZ Deletion Relatives (WZPRES)	1.05	0	0.36	0.22	1.05
31) Demonstrative Pronouns (DEMP)	0.99	0	0.35	0.20	0.99
32) Perfect Aspects (PEAS)	1.39	0	0.34	0.30	1.39
33) Split Auxiliaries (SPAU)	1.11	0	0.32	0.23	1.11
34) That Relative Clauses on Subject Position (TSUB)	1.07	0	0.24	0.21	1.07
35) Other Adverbial Subordinators (OSUB)	0.80	0	0.20	0.15	0.80
36) Predictive Modals (PRMD)	0.89	0	0.19	0.17	0.89
37) Present Participial Clauses (PRESP)	1.30	0	0.18	0.16	1.30
38) Place Adverbials (PLACE)	0.68	0	0.18	0.16	0.68
39) Time Adverbials (TIME)	1.45	0	0.17	0.22	1.45
40) Downtoners (DWNT)	0.72	0	0.17	0.15	0.72
41) That Deletion (THATD)	0.70	0	0.16	0.15	0.70
42) By-Passives (BYPA)	0.60	0	0.15	0.13	0.60
43) Sentence Relatives (SERE)	0.67	0	0.15	0.13	0.67
44) Existential There (EX)	0.99	0	0.15	0.19	0.99
45) Synthetic Negations (SYNE)	0.58	0	0.13	0.14	0.58
46) Pire-piping Relative Clauses (PIRE)	1.02	0	0.13	0.16	1.02
47) Wh Relative Clauses on Subject Positions (WHSUB)	0.85	0	0.10	0.13	0.85
48) Causative Adverbial Subordinators (CAUS)	0.46	0	0.10	0.11	0.46

Table 3.5 displays descriptive statistics of the forty-eight aggregated features in the 120 section texts of LTRAC in descending order of mean. The normalized X scores ranged from 196.50 to 0.10, indicating great differences in their uses. The SDs ranged from 21.10 to 0.11 reflecting different amounts of variation within the features.

The normalized frequencies of these forty-eight lexico-grammatical features in the NURAC and LTRAC were then analyzed by multidimensional analyses to

identify the co-occurring patterns of lexico-grammatical features in each conventional section of research articles.

The next step is to determine the best number of dimensions to be included for an analysis by a factor extraction and factor rotation. To determine the appropriate numbers of components to be retained, four issues were considered. They are i) eigenvalues: the components which greater-than-1 eigenvalues were taken to consider (Field, 2000; Rietveld & Van Hout, 1993), ii) a substantial drop on the scree plot graph: the substantial drop implies appropriate numbers of component to retain for investigation (Field, 2000), iii) a cutoff point for factor loading: features with loadings of .35 or greater was chosen (Baoya, 2015; Biber, 1995, 2004, Getkham, 2010; Kanoksilpatham, 2003), and iv) a maximum number of loading features on each dimension: the co-occurrence of five lexico-grammatical features is the minimum for interpreting the communicative functions underlying a dimension (Baoya, 2015; Biber, 1995, 2004, Getkham, 2010; Kanoksilpatham, 2003)

Dimensional analysis identifies shared variance among co-occurring features by extracting a number of underlying dimensions. It involves a number of major steps, and the results of each step are presented in detail in Chapter IV. Each extracted dimension represents the features that co-occur with high frequency in the corpus. A dimension typically is bi-polar, consisting of two groups of features: a group of features with high positive loadings, and a group of features that have high negative loadings. The presence of a set of feature is associated with the relative absence of the other set (Gorsuch, 1983). Strength of co-occurrence of each feature in a dimension is marked by its loading or weight. The absolute value (either positive or negative) of a feature's loading reflects that feature's strength of co-occurrence with other features in the co-occurring set. Co-occurring features are likely to share some similar communicative functions (Biber, 1995).

To identify the co-occurring patterns of lexico-grammatical features, this study followed researchers (e.g. Baoya, 2015; Biber, 1995, 2004; Getkham, 2010; Kanoksilapatham, 2003) all of whom invoked a Principal Component Analysis (PCA). PCA reduced the number of variables to a smaller set of variables that have strong linear inter-correlations. These new variables were called principal components which could explain a large portion of the total variance of the original observed

variables. The number of components extracted was equal to the number of observed variables in the analysis. Eigenvalues were indicative of the amount of variance explained by each component. The few number of principal components identified account for progressively less of the variance in the data. The first few components with greater eigenvalues were retained, which accounted for a maximal amount of variance of the observed variables.

However, before processing dimensional reduction in PCA, two significant values were also taken for consideration. To assess the suitability of the data for a principal Component Analysis, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) value should at least be greater than .50 and the Bartlett's Test of Sphericity value should be less than .001. If both KMO and Bartlett's Test of Sphericity value meet these criteria, it means the datasets meet the assumption for a Principle Component Analysis (Angsuchote, Vichitwanna, & Pinyopanuwat, 2011; Hair et al., 2010).

3.3.2 Research Question 2: What is the communicative function of each pattern of co-occurring lexico-grammatical features in NURAC and LTRAC?

For this question, a functional interpretation of each feature was applied. After the dimensional reduction, the dimensions were interpreted based on a shared communicative function of the co-occurring lexico-grammatical features.

Interpretation of the dimension involved the researcher examining which variables were attributable to a dimension, and labeling or naming that dimension. For example, a dimension may have included eight variables (e.g. Suasive Verbs, Public Verbs, That Clause on Subject Position, Sentence Relatives, Predicative Adjectives, and Pronoun ‘it’) all of which relate to evaluative stance; therefore the researcher would create a label of ‘Evaluative Stance’ for that dimension. The labeling of dimensions was a subjective, theoretical, and inductive process. The meaningfulness of latent dimensions was ultimately dependent on a researcher’s definition (Henson & Roberts, 2006). The reason for systematic dimensional analyses was to isolate items with high loadings in the resultant pattern matrices. In other words, it was a search to find those dimensions that, if taken together, explain the majority of the

communicative functions. If the researcher is content with these dimensions, these should then be operationalized and descriptively labeled. It was important that these labels or constructs reflected the theoretical and conceptual intent. However, the interpretation of the dimensions found in this study used other previous research studies (e.g. Baoya, 2015; Biber, 1995, 2004; Getkham, 2010; Kanoksilpatham, 2003) as a framework.

3.3.2.1 Functional Interpretation of the Dimensions

Interpretation of the functions, underlying the co-occurring patterns constituting a factor, assumes that the co-occurring patterns of lexico-grammatical features reflect some underlying shared communicative functions.

A functional interpretation of a dimension involved two perspectives of analysis: a micro and a macro perspective. A micro analysis considers communicative functions of an individual linguistic feature and shared co-occurring features in a dimension. A macro-analysis examines the intersectional and interdisciplinary similarities and differences. The two perspectives of analysis are complementary. That is, micro-analysis provides the initial basis for factor interpretation and macro-analysis confirms or disconfirms it.

However, not all variables loaded on each dimension were significant enough for functional interpretation. Some scholars (Baoya, 2015; Biber, 1995, 2004; Getkham, 2010; Kanoksilpatham, 2003) suggested that only features with loadings greater than 0.35 were considered substantial enough for a functional interpretation.

3.3.3 Research Question 3: Are there any inter-sectional statistically significant differences in the pattern used within NURAC and LTRAC?

For this question, an Analysis of Variance (ANOVA) and Post Hoc were employed. An ANOVA was employed to test for dimensional differences within each discipline across research article conventional sections. A post hoc Scheffé test was conducted to determine where differences occur. The dependent variables were dimension scores and the independent variables were research article conventional sections. Research question 3 included two main procedures. They were computing dimension scores and comparing the dimension scores.

3.3.3.1 Computation of Dimension Scores

Before computing the dimension score, the frequency score of each text needed to be standardized (Biber, 1995). This prevented the features occurring often, and having a disproportionate influence on the dimension score. Kanoksilapatham (2003), Getkham (2011), and Baoya (2015) computed a standardized score (z-score) of an individual feature by having its normalized frequency (X) in each text deducted by its overall mean frequency (X) and divided by its overall standard deviation (SD). The formula is shown below

$$\text{Z score} = (\text{Normalized X} - \text{X}) / \text{SD}$$

After the calculation of standardized scores of all features, a dimension score for each text and for each dimension was computed. This step was done by summing up the standardized frequencies of all the features with salient positive loadings on a dimension and subtracting the frequencies of the features with negative loadings on that dimension.

$$\frac{\text{Sum of the z-scores of all positive features}}{-}$$
$$\frac{\text{Sum of the z-score of all negative features}}{}$$

$$= \frac{\text{Dimension score}}{}$$

However, some features could load on more than one dimension. To clarify the distinction among factors and to ensure the independence of the dimension scores, each salient feature was included in the computation of only one dimension score. That is, only the highest loading was included in the calculation of the score of the dimension on which it loaded on, and other loadings on other dimensions (Biber, 1995),. However, if the features occurring in more than one dimension could help clearly interpret the communicative function of another dimension, the features might be also taken into consideration in other dimensions (Getkham, 2010).

The scores of each dimension were then used to determine the mean score of each conventional section. Mean dimension scores for different conventional sections were computed by adding all dimension scores for each conventional section. The summative dimension scores for the four sections were then divided by the total number of sections to yield the mean factor score for each of the four sections. The mean factor score comes from

$$\frac{\text{Sum of all dimension scores in one section}}{\text{The number of texts in that section}}$$

The mean gives information on which sections were most characteristic of each factor. From these scores, the relationship between the dimension and sections could be examined. After the calculation of the mean dimension scores, an ANOVA was carried out, followed by a Post hoc Scheffé test.

3.3.3.2 Comparisons of Mean Dimension Scores

Calculating mean dimension scores enabled the identification of the functional / stylistic profiles of each conventional section. ANOVAs were performed to determine whether there were statistically significant differences among the sections with respect to the dimension scores. In an ANOVA, sections were the independent variables, while mean dimension score on each dimension was the dependent variable. A post-hoc test was also performed to locate differences between the pair of mean scores. The significant value (P) is set at .05. In this final stage of the multidimensional analysis, the between texts, belonging to different research article conventional sections and lexico-grammatical features, were described to confirm functional interpretation of lexico-grammatical features patterns.

3.3.4 Research Question 4: What are inter-disciplinary differences in the co-occurring patterns of lexico-grammatical features between NURAC and LTRAC?

A comparative analysis was employed to compare the differences across the disciplines of research articles. For this research question, all the co-occurring patterns of lexico-grammatical features in NURAC and LTRAC were compared.

To conclude, this chapter described the research design, the corpus construction including how the disciplines, the journals, and the articles were selected to represent nursing and language teaching research articles and the data analysis regarding the four research questions of this study. The corpus was divided with regard to the four major conventional sections of nursing and language teaching research articles. The methodology of this study included one major approach: a multidimensional analysis. The multidimensional analysis was performed to identify the underlying functions of the co-occurring patterns of lexico-grammatical features in texts. Subsequently, the qualitative interpretation of the multidimensional analysis described the dimensions in terms of their underlying communicative functions of lexico-grammatical features. The computation of dimension scores allowed the comparison of texts on one factor to examine relations among different conventional sections. The examination of similarities and differences between the disciplines was also employed. This chapter is described with a table (Table 3.6) addressing the four research questions together with the research instruments, the dependent variables and independent variables, the analytical method and the statistical analysis applied in each research question. The results of the multidimensional analysis in answer to the four research questions are presented in the next chapter.

Table 3.6 Summary of Instrument and Data Analysis Techniques

	Research Questions			
	1) What are the co-occurring patterns of lexico-grammatical features in Nursing Research Article Corpus (NURAC) and Language Teaching Research Article Corpus (LTRAC)?	2) What is communicative function of each pattern of co-occurring lexico- grammatical features in NURAC and LTRAC?	3) Are there any inter-sectional statistically significant differences in the pattern used within each NURAC and LTRAC?	4) What are inter-disciplinary differences in the co-occurring patterns of lexico-grammatical features between NURAC and LTRAC?
Research Instruments	60 research articles	60 research articles	60 research articles	60 research articles
Dependent Variable (s)	lexico-grammatical features	The shared communicative function(s) of each revealed co-occurring patterns of lexico-grammatical features in NURAC and LTRAC	The dimension scores of the interpreted co-occurring patterns of lexico grammatical features in NURAC and LTRAC (the reduced factors)	The co-occurring patterns of lexico grammatical features
Independent Variable (s)	The four conventional sections (IMRD) of NURAC and LTRAC	The revealed co-occurring patterns of lexico-grammatical features in NURAC and LTRAC	The four conventional sections (IMRD) in NURAC and in LTRAC	The two disciplines (NURAC and LTRAC)
Analytical Method	Quantitative	Qualitative	Quantitative	Qualitative

CHAPTER 4

RESULTS

This chapter reports and discusses the results of the multidimensional analysis in response to the research questions.

4.1 Results

4.1.1 Co-occurring Patterns of Lexico-grammatical Features in Nursing Research Article Corpus (NURAC) and Language Teaching Research Article Corpus (LTRAC)

To answer Research Question 1, what are the co-occurring patterns of lexico-grammatical features in nursing research articles and language teaching research articles?, four functional dimensions in NURAC and six dimensions in LTRAC underlying the co-occurring patterns of lexico-grammatical features as identified by a factor analysis are presented.

Before performing Principle Component Analyses, the researcher inspected the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) value and Bartlett's Test of Sphericity to check whether the datasets were appropriate. The KMO values of the datasets were .67 (in NURAC) and .55 (in LTRAC). The Bartlett's Test of Sphericity rendered an associated highly significant value ($P < 0.001$) in both NURAC and LTRAC. The KMO and Bartlett's Test of Sphericity suggested that the variables in the datasets were significantly correlated and met the assumptions for a valid Principal Component Analysis (Angsuchote, Vichitwanna, & Pinyopanuwat, 2011; Hair et al., 2010).

To determine retainable components (or dimensions), the eigenvalues of lexico-grammatical features which were greater than l were first considered. Kaiser's

(1960) eigenvalues-greater-than-l criterion suggested a fifteen-component model (in NURAC) and a sixteen-component model (in LTRAC) both of which are too big to enable efficient interpretation. This criterion is sometimes unreliable because it tends to result in substantial overfactoring (Leandre et al., 1999). The last substantial drops in scree plots of the Eigenvalues of the correlation-matrix were further examined (Rietveld & Van Hout, 1993) (see Figures 4.1 and 4.2).

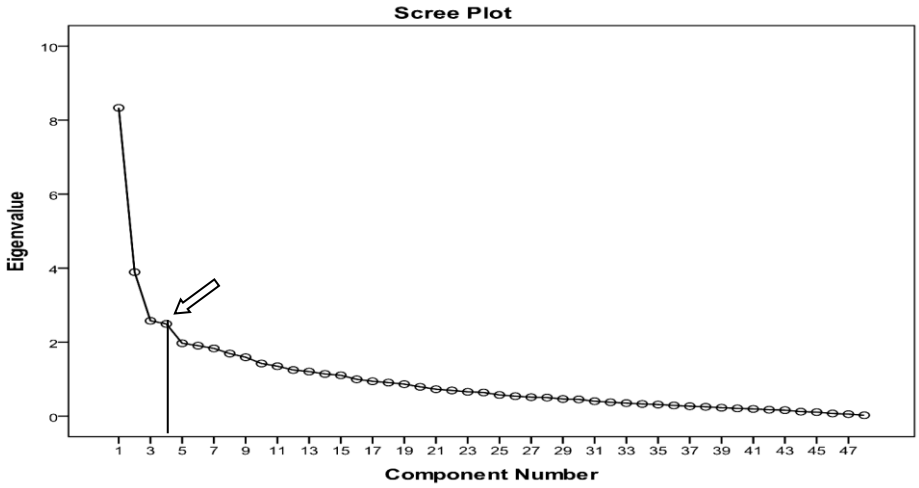

Figure 4.1 Scree Plot of Components in NURAC

Figure 4.1 shows that the last substantial drop in the magnitude of the Eigenvalues was at Component 4 in NURAC.

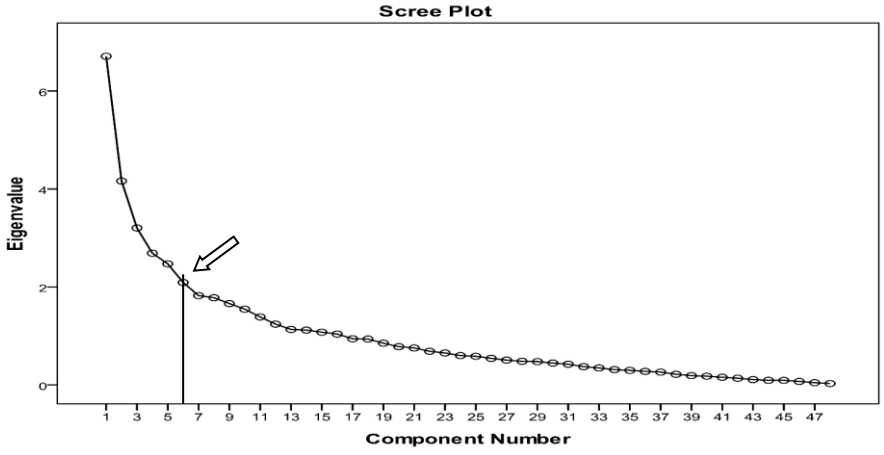

Figure 4.2 Scree Plot of the Components in LTRAC

Figure 4.2 shows the last substantial drop was at Component 6 in LTRAC

According to this procedure, models with the same number of principal components as the number of eigenvalues at and after the substantial drop would then fit the data, meaning that either a four- or five-component model could be applied in NURAC and either a six- or seven-component model could be applied in LTRAC.

Next, four separate PCAs were performed to try a four- and five-component solutions in NURAC and a six- and seven-component solutions in LTRAC to see how many lexico-grammatical features loading on the components.

In the NURAC, loading features in the four-component solution ranged from eight to eleven, but in the five-component solution, there was one component with only four features. However, there should be a minimum of five loading features for a meaningful interpretation (Biber, 1995). Thus, the five-component model was disregarded and the four-component model was performed on the NURAC.

In the LTRAC, loading features in the six-component solution ranged from five to eight, but in the seven-component solution, there were two components possessing only four loading features. Thus, the seven-component model was discarded, and the six-component model was selected to analyze the LTRAC.

Furthermore, a four-component and six-component PCA with Promax rotation were performed on the NURAC and LTRAC respectively. Promax rotation was used to allow the components to correlate with one another (Biber, 1995). From a linguistic perspective, all aspects of language are inter-related to a certain degree. Particularly, this study focuses on conventional sections of nursing and language teaching research articles that have a relatively limited range or depth of variation. Consequently, it was reasonable to assume that the components extracted from this study were likely to be correlated and a promax rotation was more appropriate for these datasets. Tables 4.1 and 4.2 display total variance explained in NURAC and LTRAC.

Table 4.1 Total Variance Explained in the NURAC

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	8.33	17.36	17.36	8.33	17.36	17.36	7.36
2	3.89	8.11	25.47	3.89	8.11	25.47	4.69
3	2.58	5.37	30.84	2.58	5.37	30.84	3.70
4	2.49	5.20	36.04	2.49	5.20	36.04	3.65
5	1.97	4.11	40.14	1.97	4.11	40.14	3.08
6	1.91	3.97	44.11	1.91	3.97	44.11	2.37
7	1.83	3.82	47.93	1.83	3.82	47.93	
8	1.69	3.52	51.45	1.69	3.52	51.45	
9	1.59	3.32	54.77	1.59	3.32	54.77	
10	1.42	2.97	57.74	1.42	2.97	57.74	
11	1.35	2.81	60.55	1.35	2.81	60.55	
12	1.25	2.60	63.16	1.25	2.60	63.16	
13	1.21	2.51	65.67	1.21	2.51	65.67	
14	1.14	2.38	68.05	1.14	2.38	68.05	
15	1.11	2.30	70.35	1.11	2.30	70.35	

Table 4.1 shows the percentage of the overall variance explained by each and all components in NURAC. As can be seen, Component 1 (after rotation) accounted for more variance than the remaining three (17.36 % in comparison with 8.11, 5.37, and 5.20 %). The four components of the NURAC accounted for 36.04 % of the overall variance.

Table 4.2 Total Variance Explained in the LTRAC

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.71	13.98	13.98	6.71	13.98	13.98	4.90
2	4.16	8.67	22.65	4.16	8.67	22.65	5.21
3	3.20	6.68	29.33	3.20	6.68	29.33	3.99
4	2.69	5.60	34.93	2.69	5.60	34.93	3.67
5	2.47	5.15	40.08	2.47	5.15	40.08	2.93
6	2.09	4.36	44.43	2.09	4.36	44.43	3.15
7	1.82	3.80	48.23	1.82	3.80	48.23	
8	1.78	3.71	51.94	1.78	3.71	51.94	
9	1.66	3.46	55.40	1.66	3.46	55.40	
10	1.55	3.22	58.63	1.55	3.22	58.63	
11	1.39	2.89	61.52	1.39	2.89	61.52	
12	1.24	2.59	64.11	1.24	2.59	64.11	
13	1.13	2.36	66.47	1.13	2.36	66.47	
14	1.12	2.33	68.80	1.12	2.33	68.80	
15	1.08	2.24	71.04	1.08	2.24	71.04	
16	1.04	2.17	73.21	1.04	2.17	73.21	

Table 4.2 shows the percentage of the overall variance explained by each and all components in LTRAC in which component 1 (after rotation) accounted for more variance than the remaining five (13.98 % compared to 8.67, 6.68, 5.60, 5.15, and 4.36 %). The six components of the LTRAC accounted for 44.43 % of the overall variance.

The 36.04 % of the overall variance in NURAC and the 44.43 % in LTRAC amounts were satisfactory, given the relative homogeneity of both nursing and language teaching research articles (Baoya, 2015; Getkham, 2011; Kanoksilapatham, 2007)**.**

In sum, a Principal Component Analysis (PCA) with promax rotation extracted four components that account for 36.04 % of the total variance of forty-eight

lexico-grammatical features in Nursing Research Article Corpus (NURAC). It also extracted six components that account for 44.43 % of the total variance of forty-eight lexico-grammatical features in Language Teaching Research Article Corpus (LTRAC). Table 4.3 presents a promax rotation component matrix of the lexico-grammatical features in NURAC.

Table 4.3 Promax Rotation Four-component Matrix of the Lexico-grammatical Features in NURAC

Lexico-grammatical Feature	Component			
	1	**2**	**3**	**4**
Predicative Adjectives	0.77			
Be as Main Verbs	0.76			
Agentless Passives	-0.59			
By-Passives	-0.58			
Adverbs	0.56			
Type Token Ratio	-0.53			
Analytic Negations	0.48			
Emphatics	0.47			
Prepositional Phrases	0.41			
Public Verbs	0.40			
Adverbial Subordinators	0.39			
Existential There				
Present Participial Clauses				
Past Tense		-0.86		
Present Tense	0.37	0.80		
Average Word Length		0.64		
Attributive Adjectives		0.59		
Present Perfect Aspects		0.59		
Demonstrative Adjectives		0.56		
Nominalizations		0.54		

Table 4.3 (Continued)

Lexico-grammatical Feature	Component			
	1	**2**	**3**	**4**
Split Auxiliaries		0.44		
Phrasal Coordinations		0.36		
Downtoners				
Possibility Modal			0.65	
First Person Pronouns			0.65	
Conjuncts			0.62	
Nouns			-0.60	
Pronoun It			0.57	
That Verb Complements	0.44		0.56	
That Relative Clauses on Subject Position			0.53	
Sentence Relatives			0.50	
That Deletion			0.46	
Causative Adverbial Subordinators			0.45	
Demonstrative Pronouns			0.42	
Private Verbs			0.41	
Predictive Modals			0.41	
Pire-piping Relative Clauses			0.37	
Place Adverbials				
Infinitives				0.68
Time Adverbials				0.60
Independent Clause Coordination				-0.59
Suasive Verbs				0.55
Third Person Pronouns				0.44
Synthetic Negations				-0.42
Gerunds				0.38
Wh Relative Clauses on Subject Positions				0.37

Table 4.3 (Continued)

Lexico-grammatical Feature	Component			
	1	**2**	**3**	**4**
Present Participial WHIZ Deletion Relatives				
Past Participial WHIZ Deletion Relatives				

Table 4.3, based on the pattern matrix (Baoya, 2015; Gorsuch, 1983; Kanoksilpatham, 2003; Thompson, 2004), recapitulates the componential structure of lexico-grammatical features in NURAC. Each component contained at least five features, with absolute values ranging from .37 to .86. Most components comprised both positive and negative loadings. However, two lexico-grammatical features cross-loaded on more than one component (Present Tense loaded on Component I and II and That Verb Complements loaded on Component I and III) and six features (Existential There, Present Participial Clauses, Downtoners, Place Adverbials, Present Participial WHIZ Deletions, and Past Participial WHIZ Deletions) did not load on any components. Table 4.4 presents dimensional (or componential) structure of a 4-component model of the forty-two lexico-grammatical features in NURAC

Table 4.4 The Four Dimensions of the Co-occurring Patterns of the 42 Lexico-grammatical Features in NURAC

	Loadings
Dimension I	
Predicative Adjectives	.77
Be as Main Verbs	.76
Adverbs	.56
Analytic Negations	.48
Emphatics	.47
That Verb Complements	(.44)
Prepositional Phrases	.40
Public Verbs	.40

Table 4.4 (Continued)

	Loadings
Dimension I	
Adverbial Subordinators	.39
Present Tense	(.37)

Type Token Ratio	-.53
By-Passives	-.58
Agentless Passives	-.59
Dimension II	
Present Tense	.80
Average Word Length	.64
Attributive Adjectives	.59
Present Perfect Aspects	.59
Demonstrative Adjectives	.56
Nominalizations	.54
Split Auxiliaries	.44
Phrasal Coordinations	.36

Past Tense	-.86
Dimension III	
Possibility Modal	.65
First Person Pronouns	.65
Conjuncts	.62
Pronoun It	.57
That Verb Complements	.56
That Relative Clauses on Subject Position	.53
Sentence Relatives	.50
That Deletion	.46
Causative Adverbial Subordinators	.45

Table 4.4 (Continued)

	Loadings
Dimension III	
Demonstrative Pronouns	.42
Private Verbs	.41
Predictive Modals	.41
Pire-piping Relative Clauses	.37

Nouns	-.60
Dimension IV	
Infinitives	.68
Time Adverbials	.60
Suasive Verbs	.55
Third Person Pronouns	.44
Gerunds	.38
Wh Relative Clauses on Subject Positions	.37

Synthetic Negations	-.42
Independent Clause Coordination	-.59

Table 4.4 shows that the remaining forty-two lexico-grammatical features co-occurred to create the four components (or dimensions). Two lexico-grammatical features were put in the parentheses since they cross-loaded on more than one dimensions. The majority of lexico-grammatical features had their loading in the third dimension. All dimensions consisted of two sets of features: positive and negative loading features. Nevertheless, either positive or negative signs could not indicate the importance of a loading but these two sets of loading features indicated the distributions occurring in a complementary pattern. In other words, when lexico-grammatical features in one set co-occur frequently in a text, the features in the other set are obviously less frequent in that text, and vice versa (Biber, 2004). Table 4.5

presents promax rotation component matrix of the lexico-grammatical features in LTRAC.

Table 4.5 Promax Rotation Six-component Matrix of the Lexico-grammatical Features in LTRAC

Lexico-grammatical Features	Component					
	1	**2**	**3**	**4**	**5**	**6**
Present Perfect Aspects	0.79					
Split Auxiliaries	0.75					
Type Token Ratio	0.64					
Possibility Modal	0.58					
Adverbs	0.57	0.39				
Infinitives	0.56					
That Relative Clauses on Subject Position	0.55					
Synthetic Negations						
Predicative Adjectives		0.80				
Be as Main Verbs		0.75				
Analytic Negations		0.63				
Downtoners		0.57				
Emphatics		0.55				
Demonstrative Pronouns		0.55				
Other Nouns		-0.45				
Predictive Modals		0.39				
Existential There						
Suasive Verbs			0.77			
Pronoun It			0.56			
That Verb Complements			0.55	0.43		
Independent Clause Coordination			-0.53			

Table 4.5 (Continued)

Lexico-grammatical Features	Component					
	1	**2**	**3**	**4**	**5**	**6**
Private Verbs			0.46			
Wh Relative Clauses on Subject Positions			0.46			
That Deletion			0.40		0.39	
Other Adverbial Subordinators			0.38			
Place Adverbials						
Agentless Passives				-0.78		
Past Tense				-0.76		
Present Tense				0.63		
Past Participial WHIZ Deletion Relatives				-0.60		
Conjuncts				0.46		
Attributive Adjectives				0.41		
Phrasal Coordinations				0.39		
Nominalizations						
Prepositional Phrases						
First Person Pronouns					0.71	
Public Verbs					0.67	
Third Person Pronouns					0.63	
Causative Adverbial Subordinators					0.56	
By-Passives					-0.45	
Gerunds						0.73
Present Participial WHIZ Deletion Relatives						0.60
Average Word Length						0.53

Table 4.5 (Continued)

Lexico-grammatical Features	Component					
	1	**2**	**3**	**4**	**5**	**6**
Time Adverbials						-0.42
Pire-piping Relative Clauses						-0.39
Present Participial Clauses						0.36
Demonstratives						0.36
Sentence Relatives						

Table 4.5 recapitulates the componential structure of lexico-grammatical features in LTRAC. Each component also contained at least five features, with absolute values ranging from .36 to .80. Most components comprised both positive and negative loadings except for Component I which consisted of only positive lexico-grammatical features. Three lexico-grammatical features cross-loaded on more than one components (Adverbs loaded on Component I and II, That Verb Complements loaded on Component III and IV, and That-deletions loaded on Component III and V) and six features (Synthetic Negation, Existential There, Place Adverbials, Nominalizations, Prepositional Phrases, and Sentence Relatives) did not load on any components. Table 4.6 presents dimensional structure of a 6-component model of the forty two lexico-grammatical features in LTRAC.

Table 4.6 The Six Dimensions of the Co-occurring Patterns of the 42 Lexico-grammatical Features in LTRAC

	Loadings
Dimension I	
Present Perfect Aspects	.79
Split Auxiliaries	.75
Type Token Ratio	.64
Possibility Modal	.58

Table 4.6 (Continued)

	Loadings
Dimension I	
Adverbs	.57
Infinitives	.56
That Relative Clauses on Subject Position	.55
Dimension II	
Predicative Adjectives	.80
Be as Main Verbs	.75
Analytic Negations	.63
Downtoners	.57
Emphatics	.55
Demonstrative Pronouns	.55
Predictive Modals	.39
Adverbs	(.39)

Nouns	-.45
Dimension III	
Suasive Verbs	.77
Pronoun It	.56
That Verb Complements	.55
Private Verbs	.46
Wh Relative Clauses on Subject Positions	.46
That Deletion	.40
Adverbial Subordinators	.38

Independent Clause Coordination	-.53
Dimension IV	
Present Tense	.63
Conjuncts	.46

Table 4.6 (Continued)

	Loadings
Dimension IV	
That Verb Complements	(.43)
Attributive Adjectives	.41
Phrasal Coordinations	.39

Past Participial WHIZ Deletion Relatives	-.60
Past Tense	-.76
Agentless Passives	-.78
Dimension V	
First Person Pronouns	71
Public Verbs	.67
Third Person Pronouns	.63
Causative Adverbial Subordinators	.56
That Deletion	(.39)

By-Passives	-.45
Dimension VI	
Gerunds	.73
Present Participial WHIZ Deletion Relatives	.60
Average Word Length	.53
Present Participial Clauses	.36
Demonstrative Adjectives	.36

Pire-piping Relative Clauses	-.39
Time Adverbials	-.42

Table 4.6 shows that the remaining forty-two lexico-grammatical features co-occurred to form the six dimensions. Three lexico-grammatical features were also put in the parentheses since they cross-loaded on more than one dimension. Most

dimensions in LTRAC also consisted of two sets of features: positive and negative loading features, however; there were no negative loading features on Dimension I.

Next, the interpretation of the 'dimensional' functions of the co-occurring patterns of the lexico-grammatical features was performed. The key to interpret an underlying function of a dimension lies in understanding the communicative function shared by the set of co-occurring lexico-grammatical features (Biber & Conrad, 2009). It is important to identify what motivates the co-occurring patterns of a set of lexico-grammatical features. It is also important to know the reasons for the complementary distribution of the positive group and the negative group. As seen, the loading of each lexico-grammatical feature on a dimension was varied. This loading reflected the degree to which the feature represented a dimension. In other words, features with higher loadings were better predictors of a dimension and had more effect on the interpretation of the functional dimension.

4.1.2 The Communicative Function(s) of the Co-occurring Patterns of Lexico-grammatical Features in NURAC and LTRAC

Regarding Research Question 2, what is the communicative function of each co-occurring pattern of lexico-grammatical features in NURAC and LTRAC?, functional analyses were utilized to interpret the four functional dimensions in NURAC and the six functional dimensions in LTRAC. The following sections attempt to interpret the dimensions in terms of their shared basic communicative functions. Each was labeled in accordance with the interpretations.

This part deals with a functional analysis of the co-occurring patterns of lexico-grammatical features in the four conventional sections (Introduction, Methods, Results, and Discussion) of nursing and language teaching research articles. At ease of understanding, results are divided into two parts. The first part deals with the interpretation of the four functional dimensions in NURAC and the second part attends to the six functional dimensions in LTRAC.

4.1.2.1 The Communicative Functions of the Co-occurring Patterns of Lexico-grammatical Features in NURAC

In NURAC, four dimensions were revealed. Each dimension consisted of a set of lexico-grammatical features.

Dimension I: Evaluative Stance Focused	
Lexico-grammatical features	Loadings
Predicative Adjectives	.77
Be as Main Verbs	.76
Adverbs	.56
Analytic Negations	.48
Emphatics	.47
That Verb Complements	(.44)
Prepositional Phrases	.41
Public Verbs	.40
Adverbial Subordinators	.39
Present Tense	(.37)

Type Token Ratio	-.53
By- Passives	-.58
Agentless Passives	-.59

Dimension I of NURAC consisted of ten positive and three negative loadings in complementary distribution. It explained the biggest portion of the total variance (17.36 %). The positive loadings were Predicative Adjectives, Be as Main Verbs, Adverbs, Analytic Negations, Emphatics, That verb Complements, Prepositional Phrases, Public Verbs, Adverbial Subordinators, and Present tense. The negative loadings were Type Token Ratio, By-Passives, and Agentless Passives.

The shared function of ‘Evaluative Stance Focused’ was responsible for high co-occurrence rates of the ten lexico-grammatical features loading on the positive end of the dimension.

Predicative Adjectives and Be as Main Verbs were the greatest and the second greatest loading features on the dimension. A form of the main verb ‘Be’ (is, are, was, were) is frequently followed by a Predicative Adjective (Baoya, 2015). Predicative Adjectives are evaluative adjectives denoting judgments of propositions or entities. Some of these adjectives include important, notable, necessary, obvious, difficult, and likely (e.g. this study is important in that…). Numerous studies reported

that evaluative adjectives are used to enhance value of the research (Auria, 2008; Baoya, 2015; Biber, 1995; Charles, 2006b; Hunston & Thompson, 2001; Getkham, 2010; Kanoksilpatham, 2003; Soler, 2002; Tutin, 2009). Another salient lexico-grammatical feature in this dimension was Adverbs. This feature includes likelihood adverbs and attitudinal adverbs. Likelihood adverbs (e.g. fortunately, importantly) and attitudinal adverbs (e.g. evidently, possibly) are sub-categories of stance adverbs, usually marking the writers' assessment (attitudes and feelings) of the proposition. (Baoya, 2015; Carter & McCarthy, 1997, 2006; Hyland, 1998; Sacks, 1971; Varttala, 1999; Varttala, 1999; Ventola, 1997). Analytic Negation (not or n't) denotes negativity in science for the purpose of exclusion, negation, denial, and rejections (Baoya, 2015; Kanoksilpatham, 2003). Emphatics express the writers' evaluative or commitment stance and emphasize a proposition (Biber et al., 1999; Hyland, 2004; Quirk et al., 1995). That Verb Complements facilitate the expression of value assessment of the propositional information and fulfill function of evaluating statement (Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003). Public Verbs are primarily speech act verbs that state propositions in reported speech. They are used to talk about evaluation, information or findings. That Verb Complements with Public Verbs are used to expand ideas and can express evaluative stance (Ayers, 2008; Baoya, 2015). Prepositional Phrases pack large amounts of information and are used as a device integrating referential information in a discourse (Baoya, 2015; Chafe, 1985 as cited in Niko, 1994; Hasselgard, Lysvag, & Johansson, 2012). Adverbial Subordinators show slight and major contrast, give reasons and comparisons and, indicate time relationships, place, and conditions in the research (Baoya, 2015). Present Tense marks a generalization (Charak & Nourouzi, 2013; Getkham, 2010; Halliday, 2013; Lackstrom et al., 1970, 1973; Li & Ge, 2009; Malcolm, 1987; Matthews & Matthews, 2007; Oster, 1981; Salager-Meyer, 1992; Smith & Bernhardt, 1997; Swales, 2004, Swales and Feak, 2004; Tod-Trimble and Trimble, 1982). It can be noted that these salient positive loading features were used to focus on authors' evaluation. Taken the lexico-grammatical features on the positive end together, Dimension I focused on expressing evaluative stance. Hence, the 'Evaluative Stance Focused' was labeled.

The negatively weighed features, Type Token Ratio (TTR), By-passive, and Agentless Passive formed the other end of the continuum of the dimension. High TTR in a text indicates that the discourse has a greater variety of word types and integrated a higher amount of information (Biber, 1995). By-passives and Agentless Passives, the highest and the second highest negative-loading features on the dimension, are frequently used to report findings, express logical relations, and to describe methodology and data analysis procedures (Baoya, 2015, Bazerman, 1988; Corson & Smollett, 2014; Hannia & Akhtar, 1985, Getkham, 2010, Gross, Harmon & Reidy, 2002; Kanoksilpatham, 2003, Martın, 2003; Riley, 1991; Swales, 2004, Swales & Feak, 2004, Tarone et al., 1981; Trimble & Trimble, 1982; Wilkinson, 1992). However, these three negative features were not salient enough to interpret their shared communicative function (Biber, 1995, 2002; Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003). Therefore, the communicative function of this negative end was not interpreted.

Text Sample 1 taken from the Discussion of Text 29 (see Appendix A) illustrates 'Evaluative Stance Focused'. The excerpt shows the use of some co-occurring positive lexico-grammatical features on Dimension I of NURAC such as Predicative Adjectives[1], Be as Main Verbs[2], Adverbs[3], Analytic Negations[4], Emphatics[5], That Verb Complements[6], Prepositional Phrases[7], Public Verb[8], Adverbial Subordinators[9], and Present Tense[10].

Text Sample 1: (Discussion of T29)

> …Since[9] parents were invited to participate in all data collection periods, irrespective of participation in earlier data collection rounds, we were able to examine a selection to the follow-up in the cohort. These analyses revealed that participation was not associated with both our exposure and outcome measures, and therefore, we assume that bias in our estimates due to selection of the cohort is likely to be small. A possible weakness is the parent-reported age at achieving the ability to sit up and walk, reported in whole months, which is a rather crude assessment of motor milestone achievement. But, we assume[10] that[6] most[5] parents remember[10] the age at which the child was able to sit up or walk, as these milestones are[2] very[3] visible[1] and appreciated…we found

minimal associations between our motor development and weight status variables of interest. Thus, our study suggests[8,10] that[6] weight status and motor milestones are[2] largely[3] independent[1] of one another and that achievement of motor milestones may not[4] be associated with later overweight[7]. Therefore, milestones are[2] not[4] likely[1] to be suitable[1]as a possible screening tool in early childhood…

Dimension II: Established Knowledge Focused	
Lexico-grammatical Features	Loadings
Present Tense	.80
Average Word Length	.64
Attributive Adjectives	.59
Present Perfect Aspect	.59
Demonstrative Adjectives	.56
Nominalizations	.54
Split Auxiliaries	.44
Phrasal Coordinations	.36

Past Tense	-.86

Dimension II of NURAC contributing 8.11 % to the total variance, consisted of eight positive and one negative loading features. Present Tense, Average Word Length, Attributive Adjectives, Present Perfect Aspects, Demonstrative Adjectives, Nominalizations, Split Auxiliaries, and Phrasal Coordinations loaded on the positive end while Past Tense was the only lexico-grammatical feature loaded on the negative end.

A focus on established knowledge was clearly discernible of the features loading on the positive end. Both Present Tense and Present Perfect Aspects are relevant to the current state of affairs (Baoya, 2015). Present Tense is used to emphasize the generality of specific findings, as well as for reference to established knowledge or universal truth (Baoya, 2015; Charak & Nourouzi, 2013; Getkham, 2010; Halliday, 2013; Lackstrom et al., 1973; Li & Ge, 2009; Malcolm,1987;

Matthews & Matthews, 2007; Oster, 1981; Salager-Meyer, 1992; Smith & Bernhardt, 1997; Swales, 2004, Swales & Feak, 2004; Tod-Trimble & Trimble, 1982). Present Perfect Aspect, loading the fourth highest in the dimension, describes an event or state that occurs during a period of time in the past and extends to the present time (Biber et al., 1999). Average Word length, loading the second highest on the dimension, marks great density of information because longer words have more specific, specialized meaning than shorter words. The higher the average word length of a text, the higher its informational density (Biber, 1995; Getkham, 2010). Attributive Adjectives, the third highest loading on the dimension, are used to provide descriptive details about the intended referents (Biber et al., 1999; Getkham, 2010; Kanoksilpatham, 2003). In this study, Attributive Adjectives included participial forms: -ing (e.g. numerous interesting studies) and -ed forms (e.g. investigated features), non participial forms (e.g. previous studies), and those that can occur only attributively (e.g. further studies). Demonstrative Adjectives make it possible for the writer to discuss different aspects of the present study mentioned near and far in the text (Baoya, 2015; Chafe, 1985 as cited in Niko, 1994; Halliday & Hasan, 1996). Demonstrative Adjectives also allow shared knowledge between readers and writers to be established (Kanoksilpatham, 2003). Nominalization allows building up of elaborate taxonomies of information (Grieve et al., 2008; Halliday, 1998; Vande Kopple, 1991). Split Auxiliaries can create rhetorical and emphasizing effects the writers would like convey to the reader and explicates marking of the writers' own persuasion (Biber, 1995; O'Connor, 2003). Phrasal Coordinations are used to connect different elements to form a more complex idea at different levels of clauses and phrases. The complexity of phrases and clauses in academic papers reflects the typical complexity of the subject matter and the density of information (Biber et al., 1999). Together, the eight co-occurring lexico-grammatical features exhibited a marked established knowledge focus in text. The positive features loading on Dimension II highlighted a concern over the established knowledge in research articles.

Only one lexico-grammatical feature loading on the negative end of the dimension is Past Tense. Past tense is used to claim non-generality about the views expressed by previous studies, to describe research activities or procedures performed (Oster, 1981), to mark events or activities during the study (Li & Ge, 2009), and to

report findings (Burrough-Boenish, 2003, Gledhill, 2000). However, the only one negative feature in this dimension was too insignificant to interpret the communicative function, and therefore not interpreted.

In sum, Dimension II served as a parameter of textual variation that marked where a text is on a continuum from a focus on narration of current findings or to a focus on established knowledge, Hence, the 'Established Knowledge Focused' was labeled.

Text Sample 2 taken from the Introduction of Text 21 (see Appendix A) illustrates 'Established Knowledge Focused'. The excerpt shows the use of some co-occurring positive lexico-grammatical features on Dimension II of NURAC such as Present Tense[1], Attributive Adjectives[2], Present Perfect Aspects[3], Demonstrative Adjectives[4], Nominalizations[5], Split Auxiliaries[6], and Phrasal Coordinations[7].

Text Sample 2: (Introduction of T21)

> …Higher[2] mortality[5] risks in many mental[2] disorders are well recognized[1,6] and may[1] be worsening over time. Data from the Global[2] Burden of Disease (GBD) study suggested that mental[2] and[7] behavioural[2] disorders account for[1] 8.6 million, or 0.5%, of all years of life lost to premature[2] mortality[5]. This is[1] equivalent to 232,000 deaths in 2010, an increase from 1990, when there were 138,000 premature[2] deaths secondary to mental[2] disorders. More than three-quarters of these[4] deaths were attributed to substance[2] use disorders. However, substance[2] use and mental[2] illness[5] are[1] commonly comorbid and mutually amplify the risk to premature[2] death, often by suicide...However, syntheses of mortality risks associated with different[2] diagnoses have not been attempted[3] since the 1998 publication of the highly influential[2] meta-analysis by Harris and Barraclough…

Dimension III: Claim Focused	
Lexico-grammatical Features	Loadings
Possibility Modal	.65
First Person Pronouns	.65
Conjuncts	.62
Pronoun It	.57
That Verb Complements	.56
That Relative Clauses on Subject Position	.53
Sentence Relatives	.50
That Deletion	.46
Causative Adverbial Subordinators	.45
Demonstrative Pronouns	.42
Private Verbs	.41
Predictive Modals	.41
Pire-piping Relative Clauses	.37

Nouns	-.60

Thirteen lexico-grammatical features loaded on the positive and one feature loaded on the negative end of this dimension. They accounted for 5.37 % of the total variance.

The positive end of this dimension was formed by Possibility Modal, First Person Pronouns, Conjuncts, Pronoun It, That Verb Complements, That Relative Clauses on Subject Position, Sentence Relatives, That Deletion, Causative Adverbial Subordinators, Demonstrative Adjectives, Private Verbs, Predictive modals, and Pire-piping Relative Clauses.

Possibility Modals (could, can) denote the writers' assessment of the possibility of the propositions presented in hypothetical scenarios expressed (Hasselgard, Lysvag, & Johansson, 2012; Hyland, 1994; Salager-Meyer, 1994). First Person Pronouns are used when the writers claim authority, exhibit some form of ownership of the content or want to expose themselves to the readers (Harwood, 2005a, 2005b; Hyland, 2002; Tang & John, 1999). Conjuncts expand and connect

different elements at various levels of clauses and phrases. The complexity of phrases and clauses in sciences reflects the typical complexity of the subject matter and the density of information in science (Biber et al., 1999; Getkham, 2010; Kanoksilpatham; 2003). Pronoun 'It' provides a mean for writers to claim and express their comments or attitudes without making their identification explicit (Biber et al., 1999; Getkham, 2010; Hewings & Hewings, 2002; Kanoksilpatham, 2003). Private Verbs with That Verb Complements or That Deletion are used to expand ideas or comments (Biber, 1995; Whitman, 2013). Pire-piping Relative Clauses and Sentence Relatives are used to modify idea units. That Relative Clause on Subject Positions are used to pack information into a content clause (Sevastopoulos, 2015). Causative Adverbial Subordinators are used to give a reason underlying the writers' comment (Sevastopoulos, 2015). Demonstrative Pronouns mark referential cohesion and establish shared knowledge between the writers and readers (Biber et al., 1999). Predictive Modals mark predictions of events or outcomes (Biber et al., 1999; Chafe, 1985 as cited in Niko, 1994; Hyland, 1994; Salager-Meyer, 1994; Ventola, 1997). In sum, this dimension focused on claiming importance of findings, and then was accordingly labeled 'Claim Focused'.

In the negative set, there was only one negative lexico-grammatical feature. It was nouns. Nouns are used as a dominant lexical means of referential specification or to establish what the text is about. A frequent co-occurrence of nouns marks a high density of information (Biber, 1995; Biber et al., 1999; Getkham, 2010), but this single negative feature did not provide any shared communicative functions. Accordingly, the negative end on this dimension was not interpreted.

Text Sample 3 taken from the Discussion of Text 4 (see Appendix A) illustrates 'Claim Focused'. The excerpt shows the use of co-occurring positive features on Dimension III of NURAC such as Possibility Modals[1], First Person Pronouns[2], Conjuncts[3], the Pronoun It[4], That Verb Complements[5], That Relative Clauses on Subject Position[6], Sentence Relatives[7], That Deletion[8], Causative Adverbial Subordinators[9], Demonstrative Pronouns[10], Private Verbs[11], Predictive modals[12], Public Verbs[13], and Pire-piping Relative Clauses[14].

Text Sample 3: (Discussion of T4)

…In this large cohort of insured adults with type 2 diabetes not treated with bariatric surgery, we[2] found[11] that[5] 1.5% of individuals with recent evidence of clinical diabetes achieved at least partial remission over a 7-year period. If these results were generalized to the 25.6 million U.S. adults living with type 2 diabetes in 2010, they would[12] suggest[13] ~~that~~[8] 384,000 adults could[1] experience remission over the next 7 years…Remission is common among patients with diabetes who have undergone bariatric surgery (70% experienced remission within 5 years after surgery). To the best of our[2] knowledge, this[10] is the first report of remission in a usual care setting among the broad population of adults with type 2 diabetes (e.g., not those who underwent bariatric surgery). Although remission of type 2 diabetes is uncommon, it[4] does occur in patients who have not undergone surgical interventions. Moreover[3], we[2] found[11] evidence of remission, albeit rare, even in individuals previously requiring oral antiglycemic medication or insulin therapy. It[4] is important to consider[11] that[5] these[10] findings were based on a conservative sampling frame that[5] excluded patients without recent evidence of clinical diabetes at baseline and using a more stringent definition of remission than typically used in the literature. These findings challenge widespread assumptions that type 2 diabetes is uniformly irreversible and progressive.…As a result[3], the frequency of HbA1c testing varied widely, particularly in our population of interest, which[7] consisted of individuals with subdiabetic HbA1c levels. This limitation is a direct result of ambiguity in clinical guidelines about the intensity of diabetes management required for these individuals. Second, the criteria by which[14]diabetes was first identified differed for subjects who experienced remission versus those who did no…Because[9] insulin is normally metabolized by the kidney…

Dimension IV: Intention Focused	
Lexico-grammatical Features	Loadings
Infinitives	.68
Time Adverbials	.60
Suasive Verbs	.55
Third Person Pronouns	.44
Gerunds	.38
Wh Relative Clauses on Subject Positions	.37

Synthetic Negations	-.42
Independent Clause Coordination	-.59

This dimension explained 5.195% of the total linguistic variation. It contained six positive and two negative lexico-grammatical features. The positive end was emerged from Infinitives, Time Adverbials, Suasive Verbs, Third Person Pronouns, Gerunds, and Wh Relative Clauses on Subject Positions. The negative end included Synthetic Negations and Independent Clause Coordination.

In the positive end, ‘infinitives’ was the highest loading feature. Infinitives can be used to integrate or expand ideas-unit in written discourse, to introduce an aim, goal, objective, and purpose, to introduce a method, to frame points in a discussion, to introduce a complement and as an adverbial purpose clause (Chafe, 1985 as cited in Niko, 1994; Getkham, 2010; Kanoksilpatham, 2003). Time Adverbials are used for reference to time (Quirk et al., 1995). Suasive Verbs allow writers to persuade, recommend, or urge the reader to accept what is expressed. This kind of verbs is used as persuasive language to indicate the importance of the research field, of the present research or of the findings (Ayers, 2008; Getkham, 2010). Third Person Pronouns are used to refer to other researchers when writers cite studies related to their research (Kuo, 1999). Gerunds allow writers to focus on actions rather than doers (Biber, 1995; Grieve et al., 2008; Halliday, 1994; Halliday & martin, 1993; Myers, 1994). WH Relative Clauses on Subject Position are used to provide information such as thing, time, place, people, and process into a content clause, (Sevastopoulos, 2015). Amalgamated, the lexico-grammatical features co-occurred on

the positive end of this dimension focused on presenting the writers' intention. In sum, the positive end of this dimension measured the extent to which texts vary in terms of purposes of the study. Hence, this dimension was label 'Intention Focused'

On the negative end, there were only two features co-occurring. They were Synthetic Negations and Independent Clause Coordinations. Syntatic Negations (no) can be used to change an affirmative statement into its opposite denial (e.g. no researchers has investigated….). Independent Clause Coordinations are used to combine or compare ideas, convey cause and effects of events, and to elaborate on a claim or extend reasoning. Nonetheless, only two negative features were not able to provide any shared communicative functions, and therefore, was not interpreted.

Text Sample 4 taken from the Methods of Text 4 (see Appendix A) illustrates 'Intention Focused'. The excerpt shows the use of some co-occurring positive lexico-grammatical features on Dimension IV of NURAC such as Infinitives[1], Time Adverbials[2], Suasive Verbs[3], Third Person Pronouns[4], Gerunds[5], and Wh Relative Clauses on Subject Positions[6]

Text Sample 4: (Methods of T4)

> …To operationalize[1] the ADA case definitions of remission, we made several conservative modifications of the definitions. We used an HbA1c level of <5.7% to define[1] complete and prolonged remission rather than 6.0%, as some studies have [ref.]. This approach follows from reference ranges used by the KPNC centralized laboratory, which[6] defines normoglycemia as an HbA1c level of <5.7% and prediabetes as an HbA1c level of 5.7-6.4%, and is consistent with national and international guidelines for the diagnosis of prediabetes and diabetes. We also required[3] at least two HbA1c measurements at least 12 or 60 months apart for partial/complete and prolonged remission, respectively. Finally[2], our definitions specified a minimum time interval between measurements rather than a time interval from the first measurement. We chose only HbA1c levels because fasting blood glucose levels are rarely used at KPNC after the diagnosis of diabetes…Cox proportional hazards models were specified to identify[1] significant variables associated with the time to any remission (partial, complete, or prolonged remission)…if they[4] lacked

continuous KPNC membership with pharmacy benefits since 1 January 2004 (no gap of 3 months) (n = 12,507); 2) if they[4] were <19 years of age as of 1 January 2005, if they[4] had type 1 diabetes (based on self-report or had diabetes onset at <30 years of age, treated with insulin only and was never treated with oral agents), if they[4] had less than two HbA1c measurement results during follow-up…

4.1.2.2 The Communicative Function(s) of the Co-occurring Patterns of Lexico-grammatical Features in LTRAC

In LTRAC, six dimensions were revealed. Each dimension also consisted of a set of lexico-grammatical features.

Dimension I: Persuasion Focused	
Lexico-grammatical Feature	Loadings
Present Perfect Aspect	.79
Split Auxiliaries	.75
Type Token Ratio	.64
Possibility Modal	.58
Adverbs	.57
Infinitives	.56
That Relative Clauses on Subject Position	.55

Dimension I of LTRAC contained Present Perfect Aspects, Split Auxiliaries, Type Token Ratio, Possibility Modal, Total Adverbs, Infinitives, and That Relative Clauses on Subject Position on the positive end, with a result of no features loaded on the negative end. This dimension contributed to 13.98 % of the total variance explaining the biggest portion.

Present Perfect Aspect, loading the highest in the dimension, is used to convince readers to see a gap between previous studies and the writers' current work, referring to other research studies specifically in the field of the studies or to the writers' previous findings, or persuading readers that the current findings are going to be established (Biber, 1995; Salager-Meyer, 1992; Swales & Feak, 2004). Split

Auxiliaries explicate marking of the writers' own persuasion or argumentative discourse designed to persuade the readers (Biber, 1995). High Type Token Ratio marks a highly exact presentation of information (Biber, 1995). Possibility Modals denote the writers' assessment of the possibility of the propositions presented in a hypothetical scenario (Hasselgard, Lysvag, & Johansson, 2012; Hyland, 1994; Salager-Meyer, 1994). Adverbs index the writers' attitude and degree of certainty towards the proposition in the clause (Baoya, 2015; Carter and McCarthy, 2006; Hyland, 1998, Sack, 1971; Skelton, 1997; Varttala, 1999; Ventola, 1997). Infinitives are used to introduce an aim, goal, objective, and purpose, to introduce a method, and to frame points in a discussion (Chafe, 1985 as cited in Niko, 1994; Getkham, 2010). That Relative Clause on Subject Positions pack information into a content clause (Sevastopoulos, 2015).

Considering the lexico-grammatical features loading on the positive end together, Dimension I of LTRAC focused on manifesting the writers' persuasion. Accordingly, the term 'Persuasion Focused' was proposed for this dimension.

Text Sample 5 taken from the Discussion of Text 46 (see Appendix A) illustrates 'Persuasion Focused'. The excerpt shows the use of some co-occurring positive lexico-grammatical features on Dimension I of LTRAC such as Present Perfect Aspects[1], Split Auxiliaries[2], Possibility Modal[3], Adverbs[4], Infinitives[5], and That Relative Clause on Subject Positions[6].

Text Sample 5: (Discussion of T46)

> …This article has discussed[1] some of the strategies that multi-communicators are resorting to as a way of responding to demands for 'doing more in less time'. The results have indicated[1] that among the skills exhibited by multi-communicators, the most salient are bringing together[4] communication tasks that[6] deal with the same topics/issues, spreading the communicator's presence over a number of communication instances, deciding what media work well together[4] on the basis of their real or perceived compatibility, and grouping diverse audiences by similar needs/requests. The study has also provided[1,2,4] some evidence that[6] seems to5 indicate that MC has started[1] to[5] reshape the way communication is conceptualized in technology-infused workplaces. It

accords with previous research that the emphasis on 'doing more in less time' has forced[1] communicators to[5] learn to juggle tasks, people and multiple media. The present study also extends previous research by indicating that MC seems to be causing communication in today's highly[4] technicalized workplaces to[5] place more emphasis on efficiency than effectiveness as has been traditionally understood[1,2,4] and defined. The results of the study have been used[1] to[5] inform the design of pedagogical tasks. Like studies that have explored[1] the interface between research and pedagogy in other areas of business communication, this study has used[1] its main results to[5] design tasks to help students develop key skills for MC in the workplace. These skills, the article has shown[1], can be better developed[2,3,4] by technology-supported tasks that[6] simulate real-world communication. The article does not intend to be exhaustive in the number and type of task samples it has shown[1] but rather[4] indicative of what technology-enhanced tasks for BE can[3] offer students in the rapidly[4] evolving workplace communication landscape that[6] has been changed[1] by the affordability and accessibility of technologies…

Dimension II: Evaluative Stance Focused	
Lexico-grammatical Feature	Loadings
Predicative Adjectives	.80
Be as Main Verbs	.75
Analytic Negations	.63
Downtoners	.57
Emphatics	.55
Demonstrative Pronouns	.55
Predictive Modals	.39
Adverbs	(.39)

Nouns	-.45

Dimension II of LTRAC was responsible for 8.67 % of the total linguistic variation. The set of Predicative Adjectives, Be as Main Verbs, Analytic Negations, Downtoners, Emphatics, Demonstrative Pronouns, Predictive Modals, and Adverbs on the positive end and Nouns on the negative end forms a complementary relationship.

Predicative Adjectives and 'Be' as Main Verbs were respectively the greatest and the second greatest loadings on the dimension. A form of the main verb 'Be' is followed by a Predicative Adjective is used to enhance the value of the research (Auria, 2008; Charles, 2006; Hunston & Thompson, 2000; Getkham, 2010; Soler, 2002; Tutin, 2009). Analytic Negations denotes negativity for the purpose of exclusion, negation, denial, rejections, and questioning (Baoya, 2015). Downtoners (e.g. practically, almost) are used to mitigate the force of assertion, or to indicate uncertainty and tentativeness thus sounding polite and moderate. Emphatics (only) are used to emphasize a proposition (Biber et al., 1999; Quirk et al., 1995). Demonstrative Pronouns help share knowledge between readers and the writers (Biber et al., 1999). Predictive Modals mark predictions of events or outcomes (Biber et al., 1999; Chafe, 1985 as cited in Niko, 1994; Hyland, 1994; Salager-Meyer, 1994; Ventola, 1997). Adverbs express attitude toward the statements of the writers (Baoya, 2015; Carter and McCarthy, 2006; Hyland, 1998, Sack, 1971; Skelton, 1997; Varttala, 1999; Ventola, 1997). Taken the positive lexico-grammatical features together, the positive end of this dimension significantly focused on presenting evaluative stances.

On the negative end, there was one lexico-grammatical feature loading, namely Nouns. A frequent occurrence of nouns marks a high density of information (Biber, 1995; Biber et al., 1999; Getkham, 2010). However, only one feature of this dimension was not enough for interpretation of the dimensional function. Therefore, the communicative function of this negative end was not interpreted. As seen, Dimension II of LTRAC focused on presenting evaluative stances. Therefore, it was labeled as 'Evaluative Stance Focused'

Text Sample 6 taken from the Introduction of Text 56 (see Appendix A) illustrates 'Evaluative Stance Focused'. The excerpt shows the use of some co-occurring positive lexico-grammatical features on Dimension II of LTRAC such as

Predicative Adjectives[1], Be as Main Verbs[2], Analytic Negation[3], Downtoners[4], Emphatics[5], Demonstrative Pronouns[6], Predictive Modals[7], and Adverbs[8].

Text Sample 6: (Introduction of T56)

…The effectiveness and efficiency of formal spelling instruction was also supported by the findings that such instruction resulted in improved phonological awareness and more[5] importantly[8] improved reading skills. Explicitly and systematically[8] teaching spelling resulted in about one-half a standard deviation improvement in phonological awareness. An average student would[7] move from the 50th percentile to the 70th percentile as a result of such instruction. Across all reading measures, formal spelling instruction produced a gain of 0.44 standard deviations, moving a typically developing students' reading performance from the 50th percentile to the 67th percentile. This[6] included positive changes in students' word reading and reading comprehension skills. While the weighted ES (0.36) for reading fluency was[2] not[3] statistically[8] significant[1], it was[2] practically[4] important[1], as defined by What Works Clearinghouse, as it exceeded an effect of 0.25. These[6] support and extend an earlier and more[5] limited review showing that spelling instruction enhanced reading performance, and it provided support for theoretical claims about the value of spelling in reading development. Moderator analyses revealed that the impact of formal spelling instruction was[2] generally[8] consistent[1] across grades and types of students. The only[5] exception involved comparisons of formal spelling instruction versus spelling is caught approaches, where the weighted ES for older students (grades 7-10) was almost[4] one half the magnitude of the ES for younger students (kindergarten to grade 6). Even so, formal spelling instruction still improved the spelling of these older secondary students. The only hypothesized advantage for formal spelling instruction that was not observed in this meta-analysis concerned the impact of such instruction on writing performance. While formal spelling instruction enhanced correct spelling in writing, it did not impact other measures of writing performance. The obtained effect was[2] positive[1], but less than one-fifth of a standard deviation. It was[2] not[3] statistically[8] and practically[4]

significant[1]. We anticipated that improved spelling performance would[7] reduce interference between spelling and other aspects of writing and make cognitive resources previously devoted to spelling available to other writing processes…

Dimension III: Claim Focused	
Lexico-grammatical Feature	Loadings
Suasive Verbs	.77
Pronoun It	.56
That Verb Complements	.55
Private Verbs	.46
Wh Relative Clauses on Subject Positions	.46
That Deletion	.40
Adverbial Subordinators	.38

Independent Clause Coordination	-.53

Dimension III of LTRAC was represented by Suasive Verbs, Pronoun It, That Verb Complements, Private Verbs, Wh Relative Clauses on Subject Positions, That Deletion, and Adverbial Subordinators on the positive end and Independent Clause Coordination on the negative end. This dimension explained a total of 6.68 % variance.

A Suasive Verb is followed by a That Verb Complement Clause to persuade, convince, recommend, or urge the reader to accept what is expressed. These features are used as persuasive language to indicate the importance of the research field, of the present research or of the findings (Ayers, 2008; Getkham, 2010). Pronoun ‘It’ provides a way for writers to express their comments or attitudes without making their identification explicit (Biber et al., 1999; Getkham, 2010; Hewings & Hewings, 2002; Kanoksilpatham, 2003). Private verbs are used with the ‘that’ verb complement or ‘that’ deletion to expand ideas or comments. That Deletion helps make a sentence more concise (Biber, 1995; Whitman, 2013). Wh Relative Clauses on Subject Positions are used to provide information (such as things, time, places, people, or processes) into a content clause (Sevastopoulos, 2015). Adverbial

Subordinators show slight or major contrast, give reasons and comparisons, and indicate time relationships, place, and conditions in the research (Baoya, 2015). Considering the positive lexico-grammatical features loading on this dimension together, the positive end of this dimension focused on claiming importance of the findings. In sum, the positive end of this dimension focused on claiming importance of findings, and was therefore labeled 'Claim Focused'.

On the negative end, there was only one feature, namely Independent Clause Coordinations, which is used to combine or compare ideas, convey cause and effects of events, and to elaborate on a claim or extend reasoning (Baoya, 2015). Nonetheless, only one lexico-grammatical feature was not enough to interpret dimensional function. Thus, the communicative function of the negative end was not interpreted.

Text Sample 7 taken from the Discussion of Text 44 (see Appendix A) illustrates 'Claim Focused'. The excerpt shows the use of some co-occurring positive lexico-grammatical features on Dimension III of LTRAC such as Suasive Verbs[1], The Pronoun It[2], That Verb Complements[3], Private Verbs[4], Wh Relative Clauses on Subject Positions[5], That Deletion[6], and Adverbial Subordinators[7].

Text Sample 7: (Discussion of T44)

> …Our data indicates[4] that[3] in mathematics definition is crucial to constituting the abstract concepts at the heart of this field, making it[2] central to contextualizing research and contributing to comprehension and persuasion in this field. As such, we argue that definition warrants status as a 'move' in the mathematics RAs based on four points. First, the prevalence of Mp in the corpus, as well as its[2] use as an initiating move, suggests[1] ~~(that)~~[6] it[2] is central in mathematics RAs. Second, it[2] enables mathematicians to share understanding of the objects discussed. Third, it[2] surpasses shared understanding by affording the basis for new insights in mathematics (i.e., novel contributions) and fourth, by establishing agreement about mathematical concepts it[2] enables argument, making it[2] central to constructing knowledge in mathematics. The prevalence of Mp in the corpus should be examined in light of disciplinary assumptions about knowledge in mathematics. First, M3 is the most frequently used move

in the corpus (32%) suggesting that[1,3] mathematicians prefer[4] presenting their work to either establishing its[2] importance and generality or highlighting the need for new research. This observation aligns with Morgan's view that because theoretical mathematicians work on original problems, they expect their audiences "to be genuinely interested in knowing the results and to need to be persuaded of the correctness of the results". But Mp is the second most prevalent move (30%), as well as the second most prevalent initiating move (43.3%). Jamison explains the historical precedent of Mp as an initiating move: There is a nearly universally accepted logical and rhetorical structure to mathematical exposition. For over two millennia serious mathematics has been presented following a format of definition-theorem-proof. Euclid's Elements from circa 300 bc codified this mode of presentation which[5]is still used today in journal articles and advanced text… While[7] the latter knowledge is probably best gained by students working with research supervisors, writing instructors should ensure that their students understand how generic conventions in any field are always driven by disciplinary assumptions about knowledge. Bazerman further argues that students must develop their critical faculties, for learning academic writing entails learning to wield tools of symbolic power for immediate rhetorical purposes…

Dimension IV: Established Knowledge versus Past Action Focused	
Lexico-grammatical Feature	Loadings
Present Tense	.63
Conjuncts	.46
That Verb Complement	(.43)
Attributive Adjectives	.41
Phrasal Coordinations	.39

Past Participial WHIZ Deletion Relatives	-.60
Past Tense	-.76
Agentless Passives	-.78

Dimension IV of LTRAC contained five positive and three negative loading features, explaining 5.60 % of the total variance. The positive features were Present Tense, Conjuncts, That Verb Complements, Attributive Adjectives, and Phrasal Coordinations. The negative features were Past Participial WHIZ Deletion Relatives, Past Tense, and Agentless Passives.

Present Tenses, loading the highest on the dimension, are used to present established knowledge or truth (Biber, 1995). Conjuncts expand an idea unit and make the idea unit become more complex (Biber et al., 1999; Kanoksilpatham; 2003). That Verb Complements are used to expand idea units or comments. Attributive Adjectives contribute to information density and provide descriptive details about the intended referents (Biber et al., 1999; Getkham, 2010). Phrasal Coordinations connect different elements to form a more complex idea at different levels of clauses and phrases (Biber et al., 1999). With the consideration of all lexico-grammatical features loading on the positive end of this dimension, the positive end focused on presenting established knowledge.

On the negative end, three salient features were notices, namely Past Participial WHIZ Deletion, Past Tense, and Agentless Passives. Past Participial WHIZ Deletion Relatives add description to the preceding noun. Past Tense is used to describe research activities or procedures performed, to mark particular events and activities occurring during the study, and to report research findings (Biber, 1995; Burrough-Boenish, 2003, Getkham, 2010; Gledhill, 2000; Li & Ge, 2009; Oster, 198). Agentless passives index an information focus on research activities, and are frequently used to report findings, express logical relations, and describe methodology and data analysis procedures. These three features together, loading on the negative end of this dimension, focus on past actions.

In sum, the positive end of this dimension focused on talking about established knowledge while the negative end emphasized presenting past actions. Consequently, this dimension was labeled ‘Established Knowledge and Past Action Focused’.

Text Sample 8 taken from the Introduction of Text 48 (see Appendix A) illustrates ‘Established Knowledge Focused’. The excerpt shows the use of some co-occurring positive lexico-grammatical features on Dimension IV of LTRAC such as

Present Tense[1], Conjuncts[2], That Verb Complements[3], Attributive Adjectives[4], and Phrasal Coordinations[5].

Text Sample 8: (Introduction of T48)

> …Negotiating is[1] among the most commonly taught communication skills in Business English and[5] features in most Business English textbooks [ref.]. In teaching negotiating skills, the focus is[1] usually on 'functions', such as making and[5] responding to proposals or agreeing and[5] disagreeing. Reported speech, however[2], is[1] not usually taught as part of negotiating, but tends[1] to be dealt within lessons devoted to grammar and written language. It is[1] therefore[2], perhaps, surprising that reported speech was found to occur frequently in naturally-occurring business interactions involving negotiations; especially imaginary or hypothetical[4] direct reported speech, as in the example quoted in the title of this article… The finding that such uses of reported speech are frequent in negotiations suggests[1] that[3] reported speech have a place in teaching negotiating skills, but as a functional device, rather than a grammatical structure…

Text Sample 9 taken from the Methods of Text 46 (see Appendix A) illustrates ‘Past Action Focused’. The excerpt shows the use of some co-occurring negative lexico-grammatical features on Dimension IV of LTRAC such as Past Participial WHIZ Deletion Relation[1], Past Tense[2], and Agentless Passives[3].

Text Sample 9: (Methods of T46)

> …Participants who had agreed to participate and had signed a consent form were sent[2,3] a link to a web-based survey which they were asked[2,3] to complete anonymously. The main aim of the survey was to explore general aspects of MC in the four multinationals. It consisted of 26 questions divided into four clusters[1]: demographics (4 items), communication practices (4 items on a 5-point Likert scale), communication tools (3 items) and communication experience (15 items on a 5-point Likert scale). The format of the survey and its items were developed[2,3] following Carrier et al.'s (2008) survey which had

two sections: the first section focused on the participants' behaviour on 12 tasks and the second section collected basic demographic information (e.g., age, gender and ethnicity). The 12 tasks included surfing the World Wide Web, doing offline computing, emailing, instant messaging (IM)/online chatting, using the telephone, texting, playing video games, listening to music, watching television, eating, reading books and magazines for pleasure, and talking in person. However, it was felt[2,3] that in its entirety the Carrier et al. survey was not suitable for the present study as it had been designed3 to examine the participants' at-home rather than at-work multitasking behaviours, therefore only a few items were included[2,3] in the survey designed for this study[1]. The survey has been reproduced[3]...

Dimension V: Ownership Focused	
Lexico-grammatical Feature	Loadings
First Person Pronouns	.71
Public Verbs	.67
Third Person Pronouns	.63
Causative Adverbial Subordinators	.56
That Deletion	(.39)

By-passives	-.45

Dimension V, contributing 5.15 % to the total variance, contained five positive features and only one negative feature. First Person Pronouns, Public Verbs, Third Person Pronouns, Causative Adverbial Subordinators, and That Deletion loaded on the positive end while By-Passives located on the negative end.

First Person Pronouns are used when the writers want to expose themselves to the readers, claim authority, and exhibit some form of ownership of the content (Harwood, 2005a, 2005b; Hyland, 2002; Tang & John, 1999). Public Verbs are used to report direct information or findings (Ayers, 2008; Baoya, 2015). Third Person Pronouns are used to refer to other researchers when writers cite studies related to their research (Kuo, 1999). Causative Adverbial Subordinators are used to

give reasons underlying the writers' comment (Sevastopoulos, 2015). That Deletion is always found with public verbs, helping to save a word and make a sentence more concise (Whitman, 2013). The positive end of this dimension focused on presenting writers' ownership.

By-passives index an information focus on research activities. They are frequently used to report findings and express logical relations as well as to describe aspects of scientific methodology and data analysis procedures. However, only one lexico-grammatical feature was not enough for interpreting a communicative function of this end of the dimension.

Evidently, the five lexico-grammatical features, co-occurring on the positive end of this dimension, together functioned as presenting writers' ownership. Hence, this dimension was labeled 'Ownership Focused'.

Text Sample 10 taken from the Methods of Text 52 (see Appendix A) illustrates 'Ownership Focused'. The excerpt shows the use of some co-occurring positive lexico-grammatical features on Dimension V of LTRAC such as First Person Pronouns1, Public Verbs2, Third Person Pronouns3, Causative Adverbial Subordinators4, and That Deletion5.

Text Sample 10: (Methods of T52)

> …With this background in mind, we[1] now describe[2] our[1] methods for answering the research questions. We[1] briefly discuss[2] the instrument, the participants, the data analysis, and the raters. Instrument Data for this research was taken from writing samples gathered from writing classes with students of varying proficiency levels. The instrument was a writing task comprised of four writing prompts, and students were given 10 minutes for each. Each prompt was worded exactly the same except for one or a few words indicating one of 42 topics. The prompts were administered on four separate occasions within a period of two weeks. The prompts' topics and task order were administered randomly to all the participants with the exception of four intact groups: non-native speakers in semi-intensive English programs (three groups) and the native English speakers who were enrolled in university first-year writing courses (one group). The individuals within each group received the

same topics in the same order, though the topics and topic orders were different among the groups. In summary, each group could receive 4 of 42 possible topics and 4 possible task orders. Participants The study included 97 participants, with 81 non-native English speaking (NNES) students and 16 native English- speaking (NES) students. All were matriculated university students engaged in undergraduate studies at the same university in the United States. Of the NES students, all 16 were enrolled in the university's first-year writing course (English 101), and all participated in this study to provide baseline, comparative data. The 81 NNES students all hailed from varying L1 backgrounds, and all were provisionally admitted to[2] the university because[4] they[3] scored below the university standard on language admission tests. When students are provisionally admitted to this university, they[3] are placed in a semi-intensive English as an International Language (EIL) program. The NNES students who participated in the study possessed proficiency levels ranging from high-intermediate to advanced on the ACTFL scale. The NNES students represent a convenience sample, chosen from intact groups based on when the students were enrolled in an EIL writing class. To facilitate comparisons, all writing samples were analyzed using the WCR, EFTR, and EFCR. To determine the WCRs, each writing sample was divided into clauses and weighted according to its communicative adequacy as outlined by Wigglesworth and Foster. After weighting the clauses, the data were reduced to ratios. To determine the EFTRs, each writing sample was divided into T-units, which were then categorized as T-units either with or without errors. This resulted in a ratio of error-free T-units to total T-units. To determine the EFCRs, each writing sample was divided into clauses, which were further categorized as clauses either with or without errors. Similarly, this produced a ratio of error-free clauses to total clauses. Data analysis Since one of this study's aims was to examine if facets other than linguistic accuracy interacted with and influenced a student's accuracy score, MFRM was employed using the FACETS software package. The defined facets were participants (n = 97), topics (n = 42), task order (n = 4), and raters (n = 2). Because[4] each ratio was used to measure the same construct, measurement method was not included as

a separate facet so as to avoid violating the requisite assumption of local independence. The software could only analyze whole numbers, so ratios were converted to a scale from 0 to 10 according to recommendations from the software's developer (M. Linacre, personal communication, June 25, 2011). Transformations were calculated by multiplying the ratio by 10 and rounding so that 0 was equal to the ratios of .00 to .04, 1 was equal to ratios of .05 to .14, and so on, with 10 being equal to ratios of .95 to 1.0. One analysis was conducted for each of the measures: WCR, EFTR, and EFCR. The analyses showed a sufficient overlap among measures, thus establishing subsets that we[1] could analyze to help answer our[1] research questions…

Dimension VI: Modified Information Focused	
Lexico-grammatical Feature	Loadings
Gerunds	.73
Present Participial WHIZ Deletion Relatives	.60
Average Word Length	.53
Present Participial Clauses	.36
Demonstrative Adjectives	.36

Pire-piping Relative Clauses	-.39
Time Adverbials	-.42

The positive loading features of this dimension were Gerunds, Present Participial WHIZ Deletion Relatives, Average Word Length, Present Participial Clauses, and Demonstrative Adjectives. On the other hand, the negative loading features included Pire-piping Relative Clauses and Time Adverbials.

On the positive end, Gerunds are used to derive nouns (Biber, 1995; Grieve et al., 2008; Halliday, 1994; Halliday & martin, 1993; Myers, 1994). Present Participial WHIZ Deletion Relatives function as adjectives, adding description to the preceding noun. Average Word Length marks the density of information (Biber, 1995; Getkham, 2010). Present Participial Clauses are shortened, dependent clauses and a form of adverbial clause enabling the writers to provide information in an

economical way. Demonstrative Adjectives help refer to entities inside and outside the text (Baoya, 2015; Chafe, 1985 as cited in Niko, 1994; Halliday & Hasan, 1996; Kanoksilpatham, 2003). In summary, the positive end of dimension VI of LTRAC measured the extent to which texts vary in terms of modifying information. Thus, the label 'Modified Information Focused' was proposed for this dimension.

On the other side of the spectrum, Pire-piping Relative Clauses are used to expand informational idea units (Biber, 1995; Chafe, 1985 as cited in Niko, 1994). Time Adverbials are used to indicate time. Nevertheless, only two negative features could not perform any clear communicative functions in writing research articles. Hence, the function was not interpreted.

Text Sample 11 taken from the Methods of Text 45 (see Appendix A) illustrates 'Modified Information Focused'. The excerpt shows the use of some co-occurring positive lexico-grammatical features on Dimension VI of LTRAC such as Gerunds[1], Present Participial WHIZ Deletion Relatives[2], Present Participial Clauses[3], and Demonstrative Adjectives[4].

Text Sample 11: (Methods of T45)

> …Based on the distinctions between qualitative, quantitative, and mixed research methods outlined above, a thorough examination was made of every empirical research article published in ESPj and JEAP during the decade 2003-2012 (N = 254). Empirical research is defined as any research reporting[2] on data that was systematically collected and analyzed at first hand by the author(s). Guest-edited issues on specific topics were included, but excluded from the study were purely theoretical or opinion pieces, editorials, or book reviews, as well as anecdotal descriptions of learning needs, curricula, courses, programs, or materials not reporting[2] any substantial phase of data gathering[1] or analysis. Research notes were excluded as they tend to be short reports on work in progress, with preliminary findings, and do not always include abstracts. Also the methods used and/or the analyses of findings are not always described in detail. The process used to categorize the articles was as follows: I first reviewed all the abstracts published in the online journals, searching for explicit reference to the research method used[3], and excluded the studies that

were clearly non-empirical. The remaining articles were then roughly divided into those using[2] primarily qualitative or quantitative methods. Any study that did not collect and statistically analyze substantial numerical data was deemed to be qualitative. However, studies based primarily on closed questionnaires or surveys were labeled as quantitative, whether or not they used statistical analyses or just simple numerical counts and percentages, whereas those based on open-ended questionnaires or semi-structured interviews were considered qualitative, especially as the latter were often associated with other qualitative methods. Normally, it was clear from the abstract whether the method was qualitative or quantitative. Where an article was difficult to categorize based on the abstract alone, the materials and methods section was examined, and a determination was made, based on the criteria described in the previous section. As discussed above, corpus-based research presented some difficulties in categorization. Many of the earlier studies tended to be focused on simple frequency and distribution counts, but as the field of corpus-based research has developed, more sophisticated schemes involving phases of qualitative semantic analysis as well as quantitative analysis have emerged[2]. If a corpus-based study contained any statistical analysis beyond simple numerical counting[1], and did not have an explicit qualitative phase, it was deemed quantitative. The term 'mixed method' was rarely used in the field of ESP during early years of the decade, and not many authors seemed to be aware of it, even though the term 'qualitative/quantitative' was used. Studies referred to as 'qualitative/quantitative' by their authors were categorized as 'mixed' provided they contained both numerical data and statistics, even if they did not fit the stricter criteria of Tashakkori and Creswell (2007) or Ivankova and Creswell (2009) that are described earlier in this[4] paper. Some researchers in ESPj and JEAP categorized their research as 'multi-level' or 'multi method.'…

The next part presents intersectional significant differences of their uses in the corpus.

4.1.3 Intersectional Differences

4.1.3.1 Intersectional Differences in NURAC

In answer to Research Question 3, "Are there any intersectional statistically significant differences in the patterns used within NURAC and LTRAC?", the tests ANOVA and Post Hoc were employed.

This section explains how different research article conventional sections were related to each dimension. The dimension scores (or factor scores) of all section observations on each dimension were calculated and then compared. The mean dimension scores (X) show the intersectional similarities and significant differences. Table 4.7 provides descriptive statistics for the dimension scores of research article conventional sections in NURAC.

Table 4.7 Means and Standard Deviations of the Four Dimension Scores of Research Article Conventional Sections in NURAC

	Section	**Mean**	**SD.**
Dimension I	Introduction	1.50	3.50
	Methods	-7.70	3.57
	Results	1.58	5.28
	Discussion	4.62	4.03
Dimension II	Introduction	6.42	3.22
	Methods	-3.82	2.48
	Results	-6.25	3.91
	Discussion	3.64	2.92
Dimension III	Introduction	3.90	5.33
	Methods	-3.42	3.94
	Results	-3.29	4.08
	Discussion	10.59	4.77

Table 4.7 (Continued)

	Section	**Mean**	**SD.**
Dimension IV	Introduction	1.45	4.08
	Methods	0.31	2.75
	Results	-3.65	4.62
	Discussion	1.89	3.34

Note: Dimension I: Evaluative Stance Focused Dimension II: Established Knowledge Focused Dimension III: Claim Focused Dimension IV: Intention Focused

An ANOVA test was conducted and results are shown in Table 4.7. This table summarizes the results of the ANOVA test of these mean differences. The details of the ANOVA test and a Post Hoc Scheffé tests can be seen in Appendix G.

Table: 4.8 Results of ANOVA Test on Dimensional Difference across Research Article Conventional Sections in NURAC

		Sum of Squares	**df**	**Mean Square**	**F**	**P**
Dimension I	Between Groups	2559.04	3	853.01	49.29	***.000
	Within Groups	2007.40	116	17.31		
	Total	4566.44	119			
Dimension II	Between Groups	3243.06	3	1081.02	107.18	***.000
	Within Groups	1169.95	116	10.09		
	Total	4413.00	119			
Dimension	Between Groups	4038.63	3	1346.21	64.70	***.000
III	Within Groups	2413.50	116	20.81		
	Total	6452.13	119			

Table: 4.8 (Continued)

		Sum of Squares	df	Mean Square	F	P
Dimension IV	Between Groups	573.40	3	191.14	13.49	***.000
	Within Groups	1644.18	116	14.17		
	Total	2217.58	119			

Note: Dimension I: Evaluative Stance Focused Dimension II: Established Knowledge Focused Dimension III: Claim Focused Dimension IV: Intention Focused

* P < .05 ** P < .01 *** P < .001

As shown in Table 4.8, all dimensional differences occurred across all research article conventional sections in NURAC at P < .001. Hence, Post Hoc Scheffé tests were then conducted to determine where differences occurred. The results are presented in Table 4.9.

Table 4.9 Summary of Multidimensional Intersectional Differences in NURAC

	(I) section	(J) section	Mean Difference (I-J)	Std. Error	P
Dimension I	Introduction	Methods	9.20	1.07	***.000
		Results	-.087	1.07	1.000
		Discussion	-3.12	1.07	*.043
	Methods	Results	-9.28	1.07	***.000
		Discussion	-12.31	1.07	***.000
	Results	Discussion	-3.03	1.07	.052
Dimension II	Introduction	Methods	10.24	.82	***.000
		Results	12.67	.82	***.000
		Discussion	2.78	.82	*.012

Table 4.9 (Continued)

	(I) section	(J) section	Mean Difference (I-J)	Std. Error	P
	Methods	Results	2.43	.82	*.037
		Discussion	-7.46	.82	***.000
	Results	Discussion	-9.89	.82	***.000
Dimension III	Introduction	Methods	7.32	1.18	***.000
		Results	7.19	1.18	***.000
		Discussion	-6.68	1.18	***.000
	Methods	Results	-.13	1.18	1.000
		Discussion	-14.00	1.18	***.000
	Results	Discussion	-13.87	1.18	***.000
Dimension IV	Introduction	Methods	1.14	.97	.714
		Results	5.10	.97	***.000
		Discussion	-.44	.97	.976
	Methods	Results	3.96	.97	***.001
		Discussion	-1.58	.97	.454
	Results	Discussion	-5.54	.97	***.000

Note: Dimension I: Evaluative Stance Focused Dimension II: Established Knowledge Focused Dimension III: Claim Focused Dimension IV: Intention Focused

* P < .05 ** P < .01 *** P < .001

In Dimension I: Evaluative Stance Focused, there were statistically significant differences across most sections. Very highly statistically significant differences were found between the Introduction and the Methods, the Methods and the Results, and the Methods and the Discussion ($P \leq .001$). A statistically significant difference was found between the Introduction and the Discussion ($P \leq .05$). However, no statistically significant differences were found between the Introduction and the Results, and between the Results and the Discussion ($P > .05$). In Dimension

II: Established Knowledge Focused, there were statistically significant differences across all research article conventional sections. Very highly statistically significant differences were found between the Introduction and the Methods, the Introduction and the Results, the Methods and the Discussion, and the Results and the Discussion ($P \leq .001$). Statistically significant differences were also found between the Introduction and the Discussion and the Methods and the Results ($P \leq .05$). In Dimension III: Claim Focused, there were statistically significant differences across most research article conventional sections. Very highly statistically significant differences were found between the Introduction and the Methods, the Introduction and the Results, the Introduction and the Discussion, the Methods and the Discussion, and the Results and the Discussion ($P \leq .001$). However, no statistically significant differences were found between the Methods and the Results ($P > .05$). In Dimension IV: Intention Focused, there were statistically significant differences across some sections. Very highly statistically significant differences were found between the Introduction and the Results, the Methods and the Results, and the Results and the Discussion ($P \leq .001$). However, no statistically significant differences were found between the Introduction and the Methods, the Introduction and the Discussion, and the Methods and the Discussion ($P > .05$).

1) Similarities and Differences among Research Article Conventional Sections in NURAC

At ease of understanding, Figure 4.3 presents the bar chart comparing the average dimension scores of research article conventional sections in NURAC and their similarities and differences.

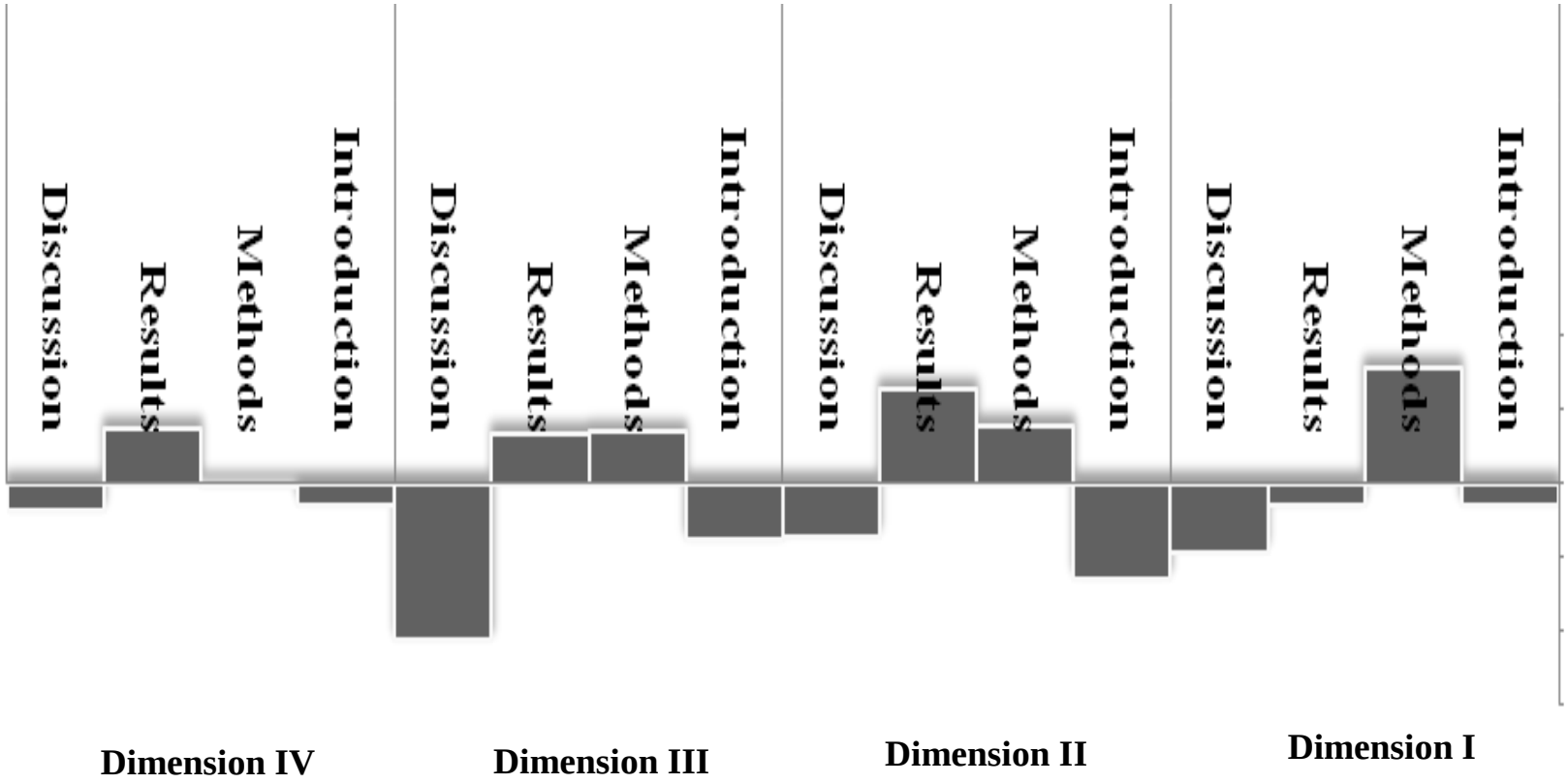

Figure 4.3 The Dimension Mean Score of Each Research Article Conventional Section in NURAC

Note: Dimension I: Evaluative Stance Focused Dimension II: Established Knowledge Focused Dimension III: Claim Focused Dimension IV: Intention Focused

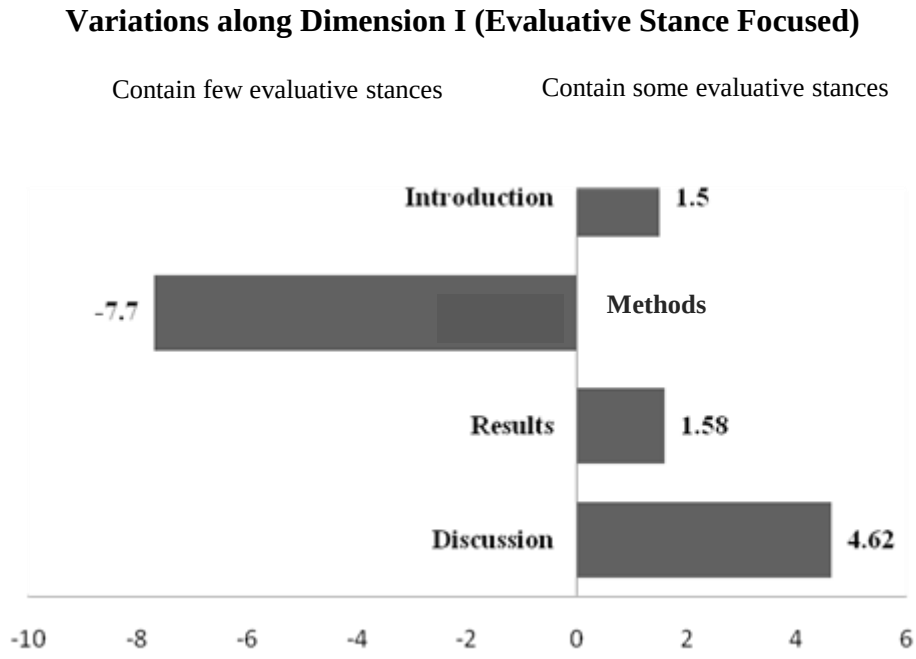

Figure 4.4 The Dimension I Mean Score of Each Research Article Conventional Section in NURAC

Note: Introductions ≈ Results and Results ≈ Discussions

Figure 4.4 reveals that in Dimension I: Evaluative Stance Focused, Predicative Adjectives, Be as Main Verbs, Adverbs, Analytic Negations, Emphatics, That Verb Complements, Prepositional Phrases, Public Verbs, Adverbial Subordinators, and Present Tense were used together to provide evaluations (Hyland & Tse, 2005). There were dimensional differences among most research article conventional sections. Yet, there were no statistically significant differences found between the Introduction and the Results, and between the Results and the Discussion.

Obviously, the Introduction and the Results as well as the Results and the Discussion contained similar styles of writing. In the introduction, research article writers discuss the usefulness, relevance, importance and investigative worth of their research topic. Research article writers claim a niche for their research by showing that the previous solutions are not completed, as signaled by words expressing ‘contrast’ or ‘negative evaluation’ (Swales, 2004). In the Results and the Discussion, research article writers evaluate their findings (Hyland & Tse, 2005). In this study, the research article writers expressed their evaluations through the uses of verbs ‘be’ (be

as main verbs) with predicative adjectives, ‘not’ (analytic negations), adverbs, emphatics, public verbs, and that verb complements. In addition, the Discussion had the highest mean score (4.62) indicating the most frequent occurrences of evaluative stance. The findings are in line with previous studies (e.g. Biber et al., 2004; Biber, 2006; Baoya, 2015, Getkham, 2010; Kanoksilpatham, 2003).

TEXT Samples 12-15 illustrate this style and show the use of some co-occurring positive lexico-grammatical features on Dimension I of NURAC (Predicative Adjectives[1], Be as Main Verbs[2], Adverbs[3], Analytic Negations[4], Emphatics[5], Prepositional Phrases[6], Public Verbs[7], Adverbial Subordinators[8], That Verb Complements[9], and Present Tense[10])

Text Sample 12: Discussion section of T29 (F1 score = 11.68)

> …This study of 25?148 children in Denmark showed that greater birth weight and BMI at age 5 months did not predict[7] delayed motor development, but was associated with achieving the ability to sit up and walk a few days earlier. Late achievement of motor milestones was[2] not[4] associated[1] with overweight at age 7 years[6], and later achievement of motor milestones was[2] not[4] a substantial risk factor for later increasing BMI, but was actually associated with a minor weight reduction for both boys and girls at age 7 years. Nine studies have reported[7] that[9] excess weight or infant overweight was[2] associated[1] with impaired motor development[6] [28-34, 48, 49] and two studies have reported[7] no association. It is[2] difficult [1]to compare findings due to varying age groups and different aspects of motor milestone development. The most[5] comparable study concluded that overweight infants were delayed in achieving motor milestones measured by the Bayley Scales of infant development. With this scale[6], infants' postural and motor skills were assessed at 3, 6, 9, 12 and 18 months. This scale is a much more[5] complex scale than parent report of the child's age of achieving the ability to sit or walk. The differences in results between this study and our could be due to the very different study populations; the 217 children in the study were children of low-income, African-American mothers in the United States, whereas participants from the Danish National Birth Cohort were of higher income and education levels than

the overall Danish population . Hence, differences in the results could be due to possible unknown confounding structures in the two populations. We identified only one comparable study on delayed motor development as a risk factor for childhood overweight. The authors found that delayed achievement of certain milestones resulted in greater adiposity later in childhood. This study was based on a sample of 741 infants, in whom skin-fold thickness and weight was measured as outcomes at age 3 years. The authors showed small positive associations between age of first achievement of sitting, rolling over and walking and later adiposity when measured by skin-fold thickness. However, weight-for-length z-score was[2] insignificantly[3] smaller[1] at age 3 years for late achievers and the results are[2] in line with ours when looking at change in BMI but not with skin-fold thickness. Our study was based on a large population of children. Although the participants in the cohort may not[4] be fully[3] representative[1] of the entire population of children in Denmark, the likely external validity of the key findings is an important strength of the study. A possible limitation is the loss to follow-up, which could introduce bias. Since parents were invited to participate in all data collection periods, irrespective of participation in earlier data collection rounds, we were[2] able[1]to examine selection to the follow-up in the cohort. These analyses revealed that participation was[2] not[4] associated[1] with both our exposure and outcome measures[6], and therefore, we assume that bias in our estimates due to selection of the cohort is[2,10] likely[1] to be small[1]. A possible weakness is the parent-reported age at achieving the ability to sit up and walk, reported in whole months, which is a rather crude assessment of motor milestone achievement. But, we assume[10] that[9] most[5] parents remember the age at which the child was[2] able[1] to sit up or walk, as these milestones are[2,10] very[3] visible[1] and appreciated. Age at sitting may not be remembered as well as walking, but parental recall of both sitting and walking has been validated in previous studies and were[2] found to be reasonably[3] accurate[1] . If parents reported[7] that[9] the children achieved the milestones sooner than the reported age, this could have reduced the already weak positive association between birth weight, BMI at 5 months of age and motor milestones towards no association . In this study,

we were[2] unable[1] to assess the foetal motor development, which may affect both birth weight and motor development in childhood, and we cannot reject that factors in foetal life may be possible confounding factors. Information about birth weight was collected from the Danish National Birth Register and is[2,10] valid[1] and as a strength of the study. The measure of height and weight at 5 months of age has the advantage of being measured by the GP, and a very high proportion of children participate in this particular examination. The outcomes of overweight and BMI at age 7 years have limitations, since the parents reported this information. A recent validation of the data showed that the differences between overweight categorized by the parents and overweight categorized by the school nurse or school doctor were 0.7% and that the data were[2] therefore valid[1]. There are no recent reports of Danish representative prevalence rates but one study reported[7] prevalence rates of overweight between 11.6 and 15.9 and of obesity between 2.6 and 3.7% in 2007 in the municipality of Copenhagen. Since the rates are[2,10] not[4] comparable[1] and since there are tendencies for a leveling off worldwide, we believe that the prevalence rates in the Danish National Birth Cohort are[2,10] not[4] largely[3] underestimated. It is[2,10] difficult[1] to predict how a possible underestimation of weight would affect our estimates, since the exposure measure of motor milestones may also be over- or underestimated. The use of BMI as a measure of weight status has been criticized, especially in children, because it may be affected by skeletal structure and muscle mass. However, BMI in this age group is highly correlated with the body fat mass. We find it unlikely[1] that our conclusions regarding motor milestones and BMI are[2,10] biased[1] by overall fat mass. But, we cannot exclude confounding factors that we were[2] unable[1] to assess. We found minimal associations between our motor development and weight status variables of interest. Thus, our study suggests[7,10] that[9] weight status and motor milestones are[2,10] largely[3] independent[1] of one another and that achievement of motor milestones may not be associated with later overweight. Therefore, milestones are[2,10] unlikely[1] to be suitable[1] as a possible screening tool in early childhood…

Text Sample 13: Result section of T6 (F1 score = 9.08)

…The correlation between the two indices[6] was[2] very[3] good[1] (r = 0.825; P < 10.8), and diurnal pattern was[2] similar[1], indicating[7] that[9], apart from a scale factor, SISP closely[3] mirrors SIMM. SIMM and SISP have been estimated in the 12 subjects at breakfast, lunch, and dinner[6]. SISP was[2] significantly[3] higher [1]than SIMM (13.86, 14.56 vs. 6.67, 5.63 dL/kg/min per ?U/mL; P < 10.3). When SISP was calculated for incompletely[3] absorbed meals, i.e., relying on reduced integration intervals, mean values of SISP were[2] virtually[3] the same[1] if one uses[10] the COB function. Conversely, SISP increased systematically[3] if COB is[2,10] not[4] used. Of note, the correlation between SISP calculated at the end of the experiment and that obtained from reduced integration intervals decreases only slightly[3], and the absolute relative error increases[10] both with and without using COB. Finally, in silico reproducibility of SISP was[2] 23.6%...

Text Sample 14: Introduction section of T13 (F1 score = 4.83)

…Delayed cerebral ischemia (DCI) is[2,10] one of the main causes of severe disability and death after aneurysmal subarachnoid hemorrhage (SAH) The pathogenesis of DCI seems to be multifactorial[1], including factors such as vasospasm, microcirculatory dysfunction, microembolism, and cortical spreading depolarization related to the primary brain injury[6] Systemic hemodynamic insufficiency such as decreased intravascular volume and low cardiac output (CO) can contribute to the development[6] of DCI[6]. The results of previous studies[6] suggest[7] that[9] early goal-directed fluid therapy (EGDT) reduces the incidence of DCI [6] after aneurysmal SAH but the effects of EGDT[6] on clinical outcomes[6] are[2,10] still[3] not[4] clear[1]. This prospective study aimed to determine whether EGDT improves outcomes compared with standard less-invasive hemodynamic therapy. The outcomes after EGDT were[2] also[3] evaluated in subgroups of patients with poor clinical grade or concurrent cardiopulmonary complications, which are[2,10] well-known risk factors for DCI and poor outcome…

Text Samples 12-14 belonged to the Discussion, the Results, and the Introduction respectively. All contained positive dimension scores (11.68, 9.08, and 4.83 respectively). The scores implied that, in these three sections, the positive lexico-grammatical features loading on this dimension were frequently found. It was obvious that these sections contained high evaluative stance, since the research article writers tried to evaluate current and previous studies in these three sections. The findings are in line with scholars (e.g. Annesley, 2010; Brett, 1994; Burton, 2008; Hess, 2004; Hirano, 2009; Kretchmer, 2003; Redman, 2011; Samraj, 2002, Sauaia, 2013; Schafer, 2009; Swales & Feak, 2004) in that research article writers refer to and evaluate some established knowledge in the Introduction, evaluate their own findings in the Results, and evaluate and compare their specific outcomes with other studies in the Discussion.

Text Sample 15: Methods section of T18 (F1 score = -14.54)

> …Immunofluorescent staining for brain tissue was performed on fixed frozen ultrathin sections as previously described.21 Primary antibodies used were bromodeoxyuridine (Santa Cruz Biotechnology), neuronal nuclei (Millipore), doublecortin (Santa Cruz Biotechnology), and synapsin-1 (Abcam). Five random microscope fields (?20) in the peri-infarction area of the brain coronal section were imaged by Olympus-BX51. The number of positive cells was calculated as the mean of the numbers obtained from the 5 pictures[6].To measure ROS generation, an ROS-horseradish peroxidase (HRP) conjugate ELISA kit (MyBioSource, Inc) was used as described previously.22 The brain samples were collected at 6 hours after the last treatment of consecutive 7-day HBO. The supernatant of the samples was incubated together with ROS-HRP conjugate in precoated plate and then incubated with a substrate for HRP enzyme. Finally[3], the absorbance was measured spectrophotometrically[3] at 450 nm in a microplate reader (Bio-Rad iMark).The brain samples were collected at 24 hours after the last treatment of consecutive 7-day HBO. Western blotting was performed as described previously.17Primary antibodies used were HIF-1?, T-cell factor-1 (TCF-1; Cell Signaling), lymphoid enhancer-binding factor-1 (LEF-1; Cell Signaling), ?-catenin (Abcam), neurogenin-1 (Santa Cruz

Biotechnology), synapsin-1, and doublecortin. Parametric data in different groups were compared using a 1-way ANOVA followed by the Turkey method. The data were presented as means?SEM. Survival was analyzed by Wilcoxon test. In all statistical analyses, a value of $P<0.05$ represents[10] statistical significance…

Text Sample 15 was taken from the Methods. Its dimension score was very low and negative (-14.54), meaning that the positive lexico-grammatical features were not frequently found. This implied that the research article writers presented less evaluative stance in the Methods than the other three sections.

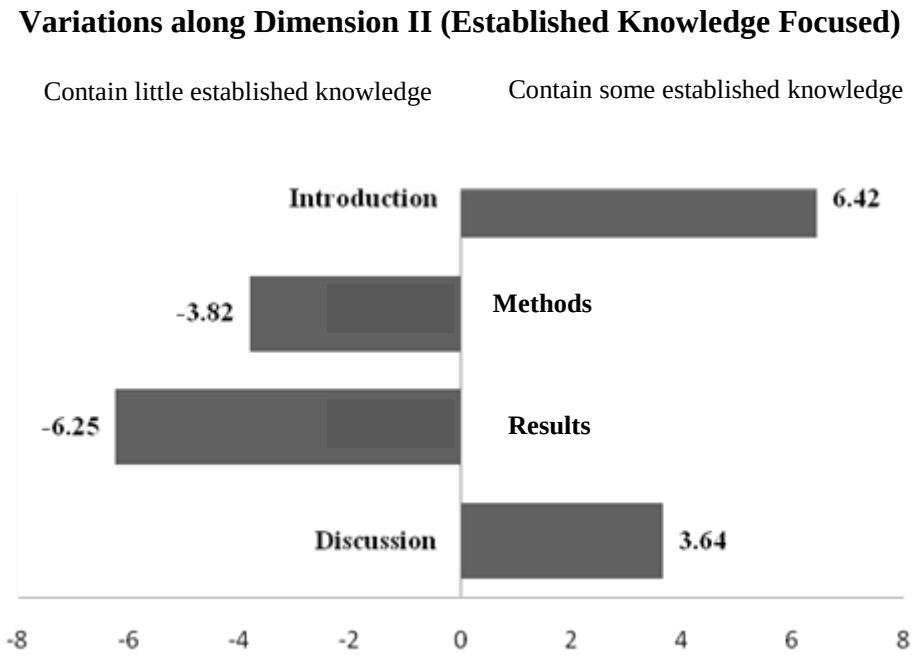

Figure 4.5 The Dimension II Mean Score of Each Research Article Conventional Section in NURAC

Figure 4.5 reveals that for Dimension II: Established Knowledge Focused, the research article writers tended to use Present Tense, Average Word Length, Attributive Adjectives, Present Perfect Aspects, Demonstrative Adjectives, Nominalizations, Split Auxiliaries, and Phrasal Coordinations to provide the reader

with established knowledge in the field. Obviously, there were dimensional differences among all research article conventional sections. The highest mean score was for the Introduction (6.42) suggesting that research article writers focused on presenting established knowledge while the lowest mean scores was for the Results (-6.25) indicating that there were very little established knowledge in the section. Presumably, the research article writers frequently mentioned established knowledge in the Introduction.

The findings are consistent with studies (e.g. Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003). However, Baoya (2015) labeled this type of discourse as 'Current Information', Getkham (2010) labeled it as 'Expression of Generality', and Kanoksilpatham (2003) labeled it as 'Attributed Knowledge and Current Findings'.

Text Samples 16-19 illustrate these stylistic differences by exemplifying the use of some co-occurring lexico-grammatical features such as Present Tense[1], Attributive Adjective[2], Present Perfect Aspects[3], Demonstrative Adjectives[4], Nominalizations[5], Split Auxiliaries[6], and Phrasal Coordinations[7].

Text Sample 16: Introduction section of T13 (F2 score = 11.06)

> …Delayed[2] cerebral[2] ischemia (DCI) has been[3] one of the main[2] causes of severe[2] disability[5] and[7] death after aneurysmal[2] subarachnoid[2] hemorrhage (SAH). The pathogenesis of DCI seems[1] to be multifactorial, including factors such as vasospasm, microcirculatory[2] dysfunction[5], microembolism, and cortical[2] spreading depolarization[5] related to the primary[2] brain injury. Systemic[2] hemodynamic[2] insufficiency[5] such as decreased intravascular[2] volume and low[2] cardiac[2] output (CO) can contribute to the development[5] of DCI. The results of those[4] previous[1] studies suggest[1] that early goal-directed[2] fluid[2] therapy (EGDT) reduces[1] the incidence of DCI after aneurysmal[2] SAH, but the effects of EGDT on clinical[2] outcomes are[1] still unclear. This[4] prospective[2] study aimed to determine whether EGDT improves[1] outcomes compared with standard less-invasive hemodynamic[2] therapy. The outcomes after EGDT were also evaluated[6] in subgroups of patients with poor clinical[2]

grade or concurrent cardiopulmonary[2] complications, which are[1] well-known[2] risk factors for DCI and poor[2] outcome...

Text Sample 16 belonged to the Introduction. It contained high positive dimension scores (11.06) implying that the positive lexico-grammatical features co-occurring in this dimension were often found in this section. This means that established knowledge was frequently mentioned in the Introduction. Presumably, this might be because the research article writers try to acknowledge the knowledge gaps by discussing established knowledge in the section. This is also in line with scholars (e.g. Hirano, 2009; Redman, 2011; Samraj, 2002; Swales & Feak, 2004) in that established knowledge is often mentioned in the Introduction.

Text Sample 17: Discussion section of T13 (F2 score = 9.32)

…This is[1] the first[2] study to confirm that EGDT can reduce[1] the incidence of DCI and[7] improve[1] functional[2] outcome at 3 months compared with standard postoperative fluid[2] management[5] in patients with SAH, especially those with poor[2] WFNS grade. EGDT may also result[6] in better clinical[2] outcomes in patients with concurrent cardiopulmonary[2] complications[5] who receive[1] treatment[5] for DCI. On the contrary, standard[2] therapy guided by conventional[2] indicators of fluid[2] balance and assisted by less-invasive[2] monitoring of CO is[1] sufficient for patients with good[2]WFNS grade. Ideal fluid[2] management [5]for the treatment[5] of DCI involves[1] knowing how much hydration[5] patients will tolerate and optimizing preload by avoiding fluid[2] overload to stabilize cardiac[2] performance for adequate cerebral[2] blood flow and[7] oxygenation[5]. Previous[2] studies that measured circulating blood volume demonstrated close[2] relationships among hypovolemia, DCI, and poor functional[2] outcome. Patients often have[1] hypovolemia from the early[2] stage after SAH, before there is a significant[2] impact on CO or brain tissue perfusion, particularly those with poor WFNS grade. Difficulty in fluid[2] optimization[5] and higher[2] risks of DCI and poor[2] outcome have been observed[3] in patients with cardiac[2] dysfunction and pulmonary[2] edema . In these[4] subsets of patients, EGDT guided by the transpulmonary[2] thermodilution[5] algorithm allows[1] estimation[5] of current[2]

hypovolemia based on decreased cardiac[2] preload (GEDI) and of effective functional/dynamic[2] hypovolemia based on continuous[2] CO monitoring, as well as quantification[5] of pulmonary[2] edema based on extravascular[2] lung water index, all of which help[1] to enable rapid[2] responses to the various hemodynamic[2] changes after SAH. Several reports have suggested[3] that the conventional[2] parameters used to monitor volume status during standard[2] therapy, such as fluid[2] balance and cardiac[2] filling pressures are poorly related[6] to the actual measured circulating blood volume and may result in greater fluid[2] intake (by 1400 mL/d) compared with EGDT. Despite such disadvantages, the data in this prospective[2] study show[1] that the less-invasive[2] methods used for standard[2]management[5] provide similar[2] results to EGDT with advanced hemodynamic[2] monitoring in patients without complications[5] and good[2]WFNS grade…

Text Sample 17 was taken from the Discussion. Though its dimension scores was also positive (9.32), a statistically significant difference between the Discussion and the Introduction implies that the writing styles between these two sections are quite different.

Text Sample 18: Methods section of T18 (F2 score = -9.33)

…Middle cerebral[2] artery occlusion (MCAO) in rats was performed as reported previously.17 One hundred eleven male (275-325 g) Sprague-Dawley rats (Indianapolis, IN) survived for 7 days from 2 hours of MCAO were used. To examine whether delayed and multiple[2] treatments[5] with HBO promote functional[2] recovery and[7] neurogenesis, 2.5 atmospheres absolutes HBO was administered starting at 7 days after MCAO for 3 sessions (n=7). Each session was 1.5 hours daily for consecutive 7 days followed with 5 days break. Doses of HBO were selected based on previous[2] studies.18 MCAO rats treated with normal baric[2] oxygen (NBO; n=7) were used as controls. For labeling proliferating cells, bromodeoxyuridine (Sigma Chemical, 50 mg/kg) was injected intraperitoneally 1 hour before each HBO treatment[5]. Neurobehavioral function was evaluated by foot-fault test (at day 1, day 15, day 27, and day 39),

and memory and learning abilities were detected by Morris water maze (from day 39 to day 42). All rats were euthanized and[7] perfused at 42 days after stroke for immunochemistry. To examine the mechanisms of HBO on neurogenesis, ROS scavenger N-acetyl cysteine (NAC; Sigma-Aldrich Co, 150 mg/kg, IP), HIF-1? inhibitor 2-methoxyestradiol (2ME2; Tocris Bioscience, 5 mg/kg, IP), and ?-catenin antagonist PKF115-584 (Tocris Bioscience, 5 mg/kg, IP) were administered, respectively, 1 hour before each HBO treatment. Neurogenesis, neurological function, and the levels of ROS and proteins were measured at day 42 or day 14…

Text Sample 19: Results section of T2 (F2 score = -11.88)

…Of the 756 potentially eligible[2] patients, 54% (n = 406) did not meet inclusion criteria, and 23% (n = 177) could not be contacted (Fig. 1). Of the 173 eligible patients, 4% (n = 7) consented but were not randomized and[7] 29% (n = 50) declined to participate. Of 116 randomized patients, 96 had HbA1c data at the 6-month assessment[5], 83 at the 12-month post-JTH assessment, and[7] 69 at the 18-month assessment [5](attrition rate 41%). Loss to follow-up 1was not different between the two groups and was not associated with clinical[2] or demographic[2] variables. When comparing study participants (n = 116) with the eligible[2] population (n = 173) to determine generalizability[5], there were no statistical[2] differences in demographic[2] variables...

TEXT Samples 18-19 were taken from the Methods and the Results. Both dimension scores were low and negative (-9.33 and -11.88 respectively). These scores implied that these sections had little or no focus on established knowledge because of the absence of lexico-grammatical features in Dimension II. The findings are in line with researchers (e.g. Annesley, 2010; Azevedo et al., 2011; Brett, 1994; Butin, 2010; Burton, 2008; Kretchmer, 2003; Carter, 2012; Kallet, 2004; Lunenburg, 2008;) in that research article writers mainly describe research procedures in the Methods and present their findings in the Results rather than mentioning established knowledge in the field.

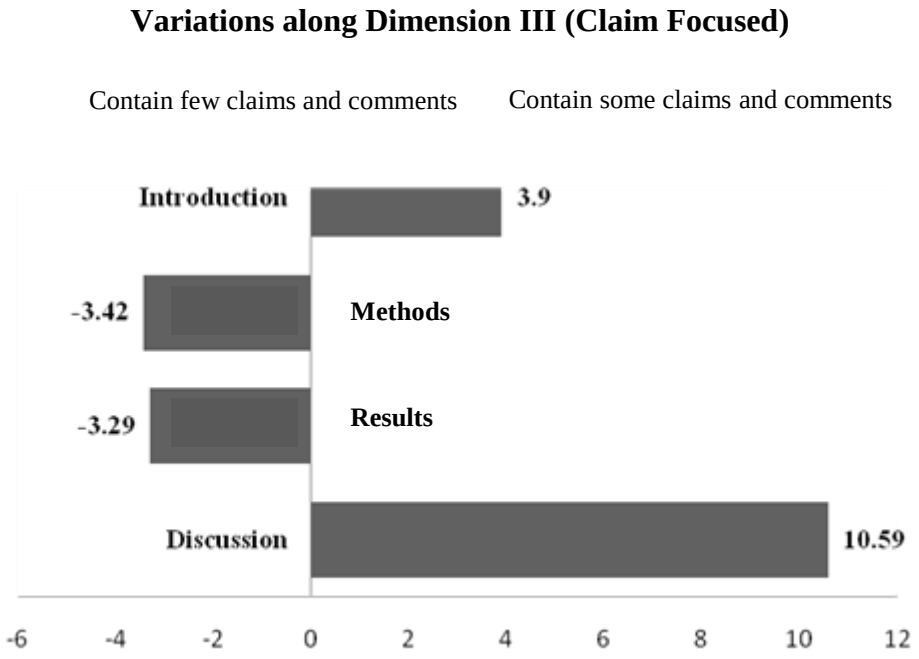

Figure 4.6 The Dimension III Mean Score of Each Research Article Conventional Section in NURAC

Note: Methods ≈ Results

Figure 4.6 shows that for Dimension III: Claim Focused, the research article writers tended to use the Possibility Modal, First Person Pronouns, Conjuncts, the Pronoun It, That Verb Complements, That Relative Clauses on Subject Position, Sentence Relatives, Demonstrative Adjectives, Private Verbs, Predictive Modals, Pire-piping Relative Clauses, Present tense, and Public verbs to claim importance of their findings. Obviously, there were statistically significant differences across most research article conventional sections except between the Methods and the Results. However, the similarities between the Methods and the Results did not indicate claims since the negative mean dimension scores of both sections (-3.42 and -3.29 respectively) suggested that both were less concerned with claims. It was likely that the research article writers typically reported what they did and gained from their observations rather than provide claims in the Methods and the Results. This is in line with Kanoksilpatham's (2007) findings. However, Kanoksilpatham labeled this as 'Framing Claim'

Text Samples 20-23 illustrate the use of some co-occurring lexico-grammatical features such as Possibility Modal[1], First Person Pronouns[2], Conjuncts[3], the Pronoun It[4], That Verb Complements[5], That Relative Clauses on Subject Position[6], Sentence Relatives[7], That Deletions[8], Causative Adverbial Subordinators[9], Demonstrative Adjectives[10], Private Verbs[11], Predictive modals[12], and Pire-piping Relative Clauses[13].

Text Sample 20: Discussion section of T11 (F3 score = 20.43)

…To our[2] knowledge, this is the first study in which[13] the effect of supplementation of enteral and parenteral nutrition during surgery on the human heart was investigated. Our[2] results showed that[5] nutrition before and during surgery augmented the myocardial and plasma arginine: ADMA ratio and plasma BCAA concentrations. Furthermore[3], the change in plasma arginine: ADMA from preoperative to postoperative was positively correlated with the change in myocardial glucose metabolism. The arginine:ADMA ratio has been proposed to be a better indicator of NO availability than either arginine or ADMA separately because[9] the ratio reflects[11] the proportion of NOS substrate and inhibitor. Accordingly, a low arginine:ADMA ratio predicted mortality in patients with cardiac failure. A reduction of the ratio decreased cardiac output and diminished the flow in the microcirculation of major organs in animals. However[3], one study did not show[11] an association between the arginine:ADMA ratio and risk of secondary cardiovascular disease events in patients with stable coronary heart disease, which[7] suggested that[5] there might[1] be other factors involved that interfere with NO availability . In contrast, the arginine:ADMA ratio might[1] explain results of studies that[6] did not show[11] an association between ADMA and cardiovascular function. For example, ADMA was not associated with impaired right ventricular function in patients with systemic sclerosis. The study by Ciurzyski et al measured the inhibitor of NOS (ie, the plasma ADMA concentration) but did not describe the plasma arginine concentration, which[7] would[12] have given information about the substrate of NOS. In the study by Ciurzyski et al, a relatively high arginine concentration may[1] have overcome detrimental effects of ADMA by reversing

the competitive inhibition of NOS by ADMA. A large number of studies investigated the effect of either increasing arginine or decreasing ADMA concentrations. An increase of plasma arginine can improve cardiovascular function, whereas the effects on the clinical outcome are not yet clear. Studies that decreased plasma ADMA have shown beneficial effects for cardiovascular function, whereas the long-term effects are still undescribed. In our patients, revascularization was performed to improve myocardial perfusion. However, an increase in myocardial perfusion is only valuable if it result in an improvement of cardiac function. In our study, an increase in the preoperative to postoperative plasma arginine: ADMA ratio was positively correlated with an increase in myocardial glucose metabolism. These findings suggest that revascularization in combination with an increase in the arginine: ADMA ratio enhances myocardial viability (ie, glucose metabolism). Probably the extra flow induced by NO elevation in addition to revascularization further improves access of substrates to cardiac cells reflected by an increase in glucose uptake. Because our enteral and parenteral nutrition increased both myocardial and plasma arginine: ADMA, our nutritional intervention might indirectly have enhanced myocardial glucose metabolism. When we focused on amino acids, the concentration of BCAAs in myocardial tissue increased during surgery in all study groups. In addition, higher changes were seen in plasma BCAA concentrations during surgery in the enteral and parenteral groups than in the control group. These results suggest ~~that~~ both enteral and parenteral nutrition are able to increase plasma concentrations of BCAAs. Unfortunately, our findings did not give a decisive answer about whether increases of myocardial BCAAs are affected by enteral and parenteral nutrition. BCAAs are essential for cardiac protein synthesis and metabolism. Previous studies have shown that nutrition is able to influence the myocardial tissue content, whereby protein synthesis in the heart was stimulated by amino acid perfusate and BCAA infusion . However, to our knowledge, the effect of nutrition before, during, and after surgery on myocardial tissue was not previously investigated. Currently, it is common practice that patients receive only clear fluids during the period before surgery

and the day after surgery, which[7] would[12] lead to starvation of the patient over a longer period of time. Fasting can[1] induce thirst, stress, insulin resistance, and nutrient deficiencies that[6] can[1] impair immune defense. In addition, glycogen reserves last only a few hours, implying[11] that[5] fasting gluconeogenesis mainly depends on the amino acid supply by body protein catabolism, which[7] further weakens the patient. Because[9] surgical patients are already in a catabolic state, prolonged fasting will[12] impair recovery after surgery. Therefore[3], it[4] can[1] be hypothesized that[5] avoiding fasting and starvation may[1] be favorable to the surgical patient. Our[2] study, which[7] showed[11] that[5] nutrition before and during surgery increased the myocardial arginine: ADMA ratio, supports this[10] notion. This[9] study had limitations. First, this[10] study was a proof-of-concept trial that[6] tested the novel strategy of nutrition during surgery as a perioperative treatment. The sample size was powered for the primary outcome (ie, the arginine concentration in myocardial tissue) and a significant difference between enteral, parenteral, and control groups. Unfortunately, the intended sample size could[1] not be reached because[9] of low consent numbers. Nevertheless, the study showed[11] that[5] it[4] is feasible to supply nutrition during surgery, which[7] can[1] increase the arginine: ADMA ratio in myocardial tissue and plasma. Second, baseline values of myocardial tissue concentrations could[1] not be measured in the nutritional groups because[9] it[4] was not possible to take myocardial biopsies before surgery. Furthermore[3], it[4] is unknown whether ADMA and other amino acids are representatively and equally distributed in the right atrial appendix compared with in other parts of the myocardium. Finally, in this[10] study, it[4] was assumed[11] that[5] supplementing arginine (and its precursor glutamine) as components of the formulated nutrition increased arginine concentrations in the heart. However[9], this[10] result could[1] be assured only by the use of isotope-labeled arginine. Therefore[9], results of our[2] study should be interpreted with caution until other studies have reproduced and cross-validated these[10] findings. In conclusion, this[10] study shows[11] that[5] enteral and parenteral nutrition before, during, and after surgery increases the arginine: ADMA ratio in the human heart and plasma and increases plasma BCAA concentrations. Furthermore[3], an increase in plasma arginine: ADMA

was associated with an increase in myocardial glucose metabolism. No adverse outcome was observed[11] when nutrition was supplied during surgery. These[10] findings justify studies to investigate whether nutritional supplementation during surgery has an independent or additional effect on cardiac recovery and the clinical outcome…

Text Sample 20 belonged to the Discussion which contained a high positive dimension score (20.43). That is, a lot of positive co-occurring lexico-grammatical features loading on Dimension II were found. It can be assumed that claims can frequently be found in the Discussion. Presumably, this could be because the research article writers try to claim importance of their findings in the Discussion. This is in line with researchers (e.g. Hess, 2004; Kretchmer, 2008; Sauaia, 2013; Schafer, 2009) in that the purpose of the Discussion is to discuss the significance of the findings, explain any new understanding or fresh insights about the problem, and claim for how the results can be more significantly applied.

Text Sample 21: Introduction Section of T12 (F3 score = 19.76)

…Monosodium glutamate 4 has been used for over a century to increase the savory umami taste of food. When MSG is combined with the purine nucleotide inosine 5-monophosphate (IMP), these[10] chemicals act synergistically to further increase the flavor of umami . Because[9] MSG enhances flavor and, thereby, palatability, and palatability is known[11]to increase short-term intake , it[4] was initially thought[11] ~~that~~[8] MSG would[12] increase short-term intake . However[3], short-term effects of MSG on appetite have been shown[11] to reduce over time . This[10] effect raises the possibility that MSG may[1] also modulate postingestive satiety by giving umami a dual role in appetite control. It[4] has been suggested that[5] the ability to taste umami arose as a way of detecting the presence of protein , and it[4] may[1] be this potential to signal the presence of protein in foods that[6] contributes to satiety . There has been considerable evidence that protein is more satiating than either carbohydrate or fat and is evident in inducing satiety both in long- and short-term trials . In support of these[10] ideas, 2 recent studies in our[2] laboratory

showed[11] that[5] MSG reduced the postingestive recovery of hunger and improved energy compensation (COMPX) when consumed in combination with protein. Similarly[3], it[4] has been shown[11] that[5] increasing the MSG content in infant formula causes the same increase in satiation and satiety as when a protein hydrolysate formula milk is used, which[7] is known[11] for its [4] effects on improving appetite control because[9] of added protein and free glutamate . However[3], not all studies have shown[11] evidence that MSG enhances satiety . 5-Inosinic acid (from which[13] IMP is derived) is predominantly present with glutamic acid (from which[13] MSG is derived) in animal protein , and thus[3], IMP may[1] be a strong candidate for enhancing sensory associations with protein, further increasing the salience of the protein signal provided by MSG and, in turn, reducing appetite and intake in a high-protein context. However[3], few studies have looked at effects of MSG plus IMP on measures of appetite and satiety. Indeed, the only studies to date that[6] have examined effects of MSG plus IMP on acute satiety in adults showed[11] no evidence of enhanced satiety , although these[10] experiments used control preloads that[6] were naturally high in protein [and, thus[3], high in monosodium glutamate and inosine 5?-monophosphate (MSG/IMP)], which[7] would[12] have potentially masked an effect of MSG/IMP. The current research, which[7] built on our[2] recent findings by using a low-MSG plus IMP preload , assessed the effects of a control preload and a high-energy, high-carbohydrate and -protein soup preload with added monosodium glutamate and inosine 5-monophosphate (MSG/IMP+) or without added monosodium glutamate and inosine 5-monophosphate (MSG/IMP?) on subsequent intake of an ad libitum meal provided 45 min after preload intake. Critically, this was the first study to our[2] knowledge to assess the immediate impact of MSG/IMP on flavor and appetite and the subsequent experience of satiety. The inclusion of assessments of appetite and eating rate during preload intake depending on the addition of MSG/IMP allowed for a dissociation of effects on acute appetite stimulation and satiation . We[2] predicted an acute appetizer effect , slower decline in rated hunger, and faster eating speed irrespective of added energy as a consequence of flavor enhancement by MSG/IMP. On the basis of our[2] recent findings with MSG

alone, we[2] also predicted that[5]MSG/IMP would[12] further enhance the satiating effects of added protein postingestion…

Text Sample 21 was taken from the Introduction. Though its dimension score was also positive (19.76), a statistically significant difference between the Introduction and the Discussion implies that the writing styles between these two sections are quite different.

Text Sample 22: Results Section of T18 (F3 score = -10.05)

…To test a role of HIF-1/-catenin signaling pathway in cell differentiation after MCAO and HBO, we[2] detected the expression of neurogenin-1 (a gene implicated in neuronal differentiation and one of the downstream transcription factors of ?-catenin), doublecortin, and synapsin-1 by Western blot after the consecutive 7-day treatments. Delayed HBO significantly increased the expression of neurogenin-1, doublecortin, and synapsin-1. Administration of NAC, PKF, and 2ME2 reversed the effects of HBO. Representative Western blots and quantitative analysis of neurogenin-1, doublecortin (DCX; C), and synapsin-1 after consecutive 7-day hyperbaric oxygen (HBO) treatments. HBO upregulated the expression of neurogenin-1, DCX, and synapsin-1, and these[10] effects were abolished by reactive oxygen species (ROS)/hypoxia-inducible factor (HIF)…

Text Sample 23: Methods Section of T15 (F3 score = -8.94)

Our[2] analysis was based on all patients (>18 years) with ischemic stroke or clinically defined transient ischemic attack who were admitted to 35 of 36 Austrian stroke units and registered from January 1, 2005, and December 31, 2012. It[4] was prespecified to adjust baseline characteristics and quality of care parameters for age in case of significant disproportions between sexes. Follow-up information, including data on subsequent neurorehabilitation after stroke unit care, mortality, and functional outcome (according to the mRS), was assessed at 3 months after the cerebrovascular index event and was analyzed in

a multivariate model, correcting for demographic and clinical confounders (age, pre-existing disability [mRS], stroke severity [National Institutes of Health Stroke Scale score], vascular risk factors [hypertension, diabetes mellitus, hypercholesterolemia], atrial fibrillation [AF], thrombolytic therapy, and stroke pathogenesis). These[10] covariates were shown[11] to influence the target variables significantly (P 0.01). Neurologists obtained follow-up data by personal or phone contact.

As seen in the Text Samples 22-23, the Results and the Methods were similar in that both contained low negative dimensional scores with few Possibility Modals, First Person Pronouns, Conjuncts, the Pronoun It, That Verb Complements, That Relative Clauses on Subject Position, Sentence Relatives, That Deletions, Causative Adverbial Subordinators, Demonstrative Adjectives, Private Verbs, Predictive Modals, and Pire-piping Relative Clauses. The negative and low scores implied that claims were less focused in the Results and the Methods. The results are congruent with researchers (e.g. Annesley, 2010; Azevedo et al., 2011; Baoya, 2015; Brett, 1994; Butin, 2010; Burton, 2008; Carter, 2012; Getkham; 2010; Kallet, 2004; Kanoksilpatham, 2003; Kretchmer, 2003; Lunenburg, 2008) in that the research article writers focus on explaining research procedure and presenting results in these two sections rather than providing significance claims of their results.

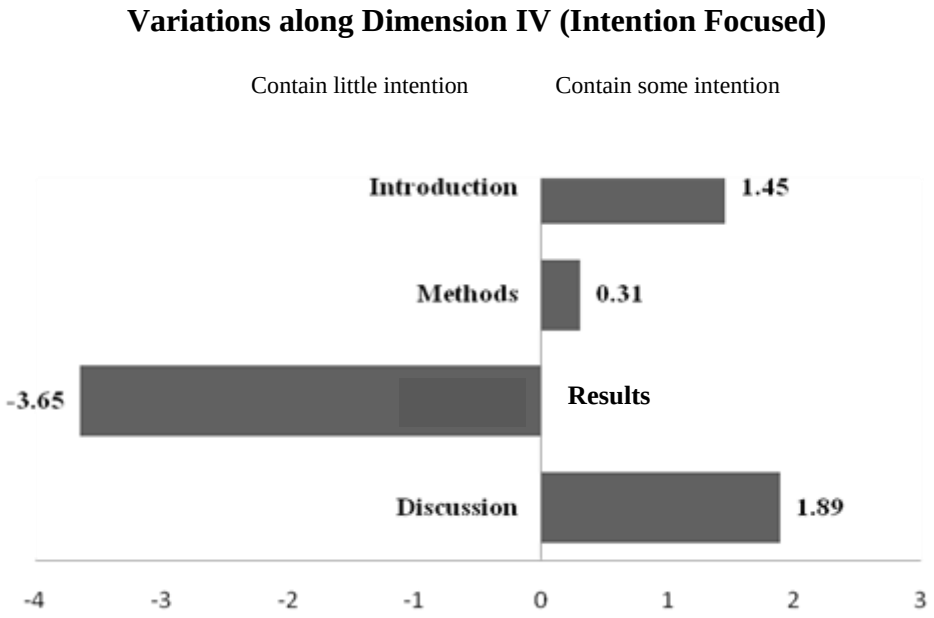

Figure 4.7 The Dimension IV Mean Score of Each Research Article Conventional Section in NURAC

Note Introductions ≈ Methods, Introduction ≈ Discussion, and Methods ≈ Discussions

Figure 4.7 presents that for Dimension IV, Intention Focused, the research article writers tended to use Infinitives, Time Adverbials, Suasive Verbs, Third Person Pronouns, Gerunds, and Wh Relative Clauses on Subject Positions to exhibit their intentions to readers. There were no statistically significant differences found between the Introduction, the Methods, and the Discussion.

Evidently, the Introduction, the Methods, and the Discussion contained similar styles of writing. In the Introduction, the research article writers stated the purposes of their study. In the Methods, the research article writers explained what procedures they had used to investigate in the study regarding each objective, research question, and hypothesis. In the Discussion, the research article writers discussed the findings by referring back to the purposes, research questions, and hypotheses proposed at the Introduction sections. The findings are in line with Getkham's (2010) and Kanoksilpatham's (2003) studies. Both scholars similarly labeled this kind of discourse as 'Expression of Purposes'.

Text Samples 24-27 illustrate the use of some co-occurring lexico-grammatical features such as Infinitives[1], Time Adverbials[2], Suasive Verbs[3], Third Person Pronouns[4], Gerunds[5], and Wh Relative Clauses on Subject Positions[6].

Text Sample 24: Discussion section of T8 (F4 score = 12.49)

…That women with high BMI display these psychosocial characteristics has important implications because these traits are often associated with worse breastfeeding[5] outcomes. Fortunately, in intervention studies, other researchers have shown that breastfeeding[5] initiation and duration increased in women who[6] received support to increase[1] their[4]confidence or increased support from family members and other mothers who[6] have breastfed. Surprisingly, the only support interventions in obese women did not result in an increase in breastfeeding[5] duration. Future research should continue to explore[1] the effect of increasing breastfeeding[5] support and confidence in overweight and obese mothers. One psychosocial factor that did not differ by BMI status was that of behavioral beliefs related to breastfeeding[5]. Approximately 70% of women in each BMI group had "good" behavioral beliefs. Women's beliefs influence their[4] decision to breastfeed[1], and perhaps this played a role in our finding that overweight and obese women intended[3] to breastfeed[1] in similar proportions to under-/normal-weight women and that overweight and obese women intended[3] to breastfeed[1] for similar lengths of time. To our knowledge, the role that psychosocial factors play in an association between maternal BMI and breastfeeding[5] intentions has not previously been studied…

Text Sample 25: Introduction section of T17 (F4 score = 11.46)

…The Alberta Stroke Program Early CT Score (ASPECTS) grading system provides a systematic method to quantify[1] and describe the topography of tissue changes in the brain due to acute ischemic stroke in the anterior circulation.1-3 ASPECTS scoring of baseline imaging[5] with CT or MRI has been established as a reliable predictor of clinical outcome after various therapeutic strategies, including reperfusion strategies.4-6 Such

semiquantitative information on the extent or number of regions within the brain affected by ischemia rapidly provided by ASPECTS may be used to select[1] optimal candidates for endovascular therapies. This information on baseline imaging[5] may be used to predict[1] outcome, yet follow-up ASPECTS at 24 hours may also provide early[2] estimates of therapeutic effectiveness after endovascular therapy. The change of such serial ASPECTS on imaging[5] from baseline to 24 hours after revascularization may, therefore, provide an early[2] biomarker of therapeutic success or failure…

Text Sample 26: Methods section of T8 (F4 score = 6.80)

…The Infant Feeding Practices Study II (IFPS II) is a longitudinal cohort study of women from late pregnancy through their[4] infants' first year of life that was drawn from a nationally distributed consumer panel in the United States from May 2005 to June 2007. Study data were collected via mail-in questionnaires, one questionnaire prenatally and 10 questionnaires postpartum. Detailed information on the study's methods are shown elsewhere . The 3033 women who[6] completed both the birth screener and neonatal questionnaire were available for this study. Of these women, 154 women were ineligible because they[4] lacked data on prepregnancy weight or height, which[6] were necessary to calculate[1]BMI (n = 39), or they[4] did not declare their[4] infant-feeding intention in the prenatal questionnaire (n = 115). Of eligible women, 55 women were excluded because they[4] had identifiable, extreme values for BMI [in kg/m2; <16 (n = 9) or >60 (n = 3)], a gestation duration >42 wk (n = 42), or the infant's birth weight was >6000 g (n = 1). As a result, we included 2824 participants in our analyses. This research was considered exempt by the Institutional Review Board at Cornell University. The IFPS II data set has many relevant variables for numerous constructs. To account for[1] this, some quantitative variables were recorded into groups on the basis of our previous knowledge and convention in the field. Prepregnancy BMI was coded as under- or normal-weight (BMI <25.0) (there were too few underweight women to categorize them separately), overweight (BMI from 25.0 to 29.9), or obese (BMI 30.0) on the basis of self-

reported height and weight measures. We created the following 4 psychosocial variables that we believed could be related to BMI and breastfeeding[5] outcomes on the basis of past findings and the theory of planned behavior and social cognitive theory : social knowledge of breastfeeding[5], social influence toward breastfeeding[5], attitude and behavioral beliefs toward breastfeeding[5], and maternal confidence in breastfeeding[5]. Household income was reported as a percentage of the poverty income ratio (PIR) and categorized as <185% of PIR, between 185% and 350% of PIR, and >350% of PIR. Maternal race-ethnicity was categorized as non-Hispanic white, non-Hispanic black, non-Hispanic other, and Hispanic (any race). Planned return time to work[1] was categorized on the basis of the time in weeks postpartum when a mother planned to return[1] to work[1] as follows: not planning return to work[1], ?6, 7-12, or >12 wk. Actual return time to work[1] was categorized as the time in weeks postpartum when a woman returned to work[1] as follows: did not return to work[1], returned at ?6, 7-12, or >12 wk. Education was categorized as high school education or less, some college education, or a college graduate. Marital status and smoking[5]status were ascertained during the woman's third trimester of pregnancy, and both variables were categorized as yes or no. The delivery method was categorized as vaginal or cesarean. Past breastfeeding[5] experience was categorized as yes if a woman had breastfed a previous infant 1 mo or no if she had never breastfed or had breastfed a previous infant <1 mo. The gestation duration (wk) and infant birth weight (g) were both included as continuous variables. Infant-feeding intention was categorized as the intention to breastfeed[1] if the mother intended[3] to breastfeed[1] her infant to any extent after birth or intention to formula feed if she did not intend[3] to breastfeed[1] to any extent…

As seen in the TEXT SAMPLEs 24-26, the Discussions, the Introduction, and the Methods were similar in that they contained a lot of positive lexico-grammatical features loading on Dimension III and contained positive dimension scores (12.49, 6.80, and 11.46 respectively). It can be said that the research article writers frequently express their intentions in these three sections. This is also in

line with several scholars (e.g. Azevedo et al., 2011; Butin, 2010; Carter, 2012; Hirano, 2009; Hess, 2004; Kallet, 2004; Kretchmer, 2008; Lunenburg, 2008; Redman, 2011; Samraj, 2002; Sauaia, 2013; Schafer, 2009; Swales & Feak, 2004) in that research article writers frequently express their intention in the objectives and hypotheses parts of the Introduction, explain how they intend to analyze the results in the Methods, and provide suggestions and intentions for further research in the Discussion.

Text Sample 27: Results section of T4 (F4 score = -8.23)

> …The mean interval (SD) between HbA1c tests among patients not in the remission group was 212 days (118 days). The median time since the diagnosis of diabetes in our cohort was 5.9 years, and the average baseline HbA1c level was 7.4%. The 18,684 individuals (15.2%) in the subset with new-onset diabetes, defined as 2 years since diagnosis, were younger, were more likely to have[1] their diabetes controlled by diet, and had fewer comorbidities…

As seen in the Text Sample 27, the Results contained few positive lexico-grammatical features and its dimension score was low and negative (-8.23). It could be said that the research article writers mentioned their intentions less frequently in the Results. This is in accordance with researchers (e.g. Annesley, 2010; Brett, 1994; Burton, 2008; Kretchmer, 2003) in that research article writers reports their findings in the Results without talking about their intentions.

4.1.3.2 Intersectional Differences in LTRAC

Table 4.10 provides descriptive statistics for the dimension scores of research article conventional sections in LTRAC.

Table 4.10 Means and Standard Deviations of the Six Dimension Scores of Research Article Conventional Sections in LTRAC

	Section	**Average**	**SD.**
Dimension I	Introduction	2.52	2.98
	Methods	-1.65	2.90
	Results	-3.40	4.04
	Discussion	2.53	4.80
Dimension II	Introduction	-0.72	3.67
	Methods	-3.45	3.51
	Results	0.55	5.51
	Discussion	3.62	4.73
Dimension III	Introduction	0.31	3.06
	Methods	-2.51	3.77
	Results	-0.22	5.16
	Discussion	2.43	5.26
Dimension IV	Introduction	7.31	2.87
	Methods	-1.70	3.75
	Results	1.99	3.26
	Discussion	5.08	4.28
Dimension V	Introduction	-0.60	2.21
	Methods	-0.41	3.11
	Results	0.22	4.67
	Discussion	0.79	2.18
Dimension VI	Introduction	1.01	3.35
	Methods	-0.54	4.05
	Results	-1.88	3.67
	Discussion	1.41	3.23

Note: Dimension I: Persuasion Focused Dimension II: Evaluative Stance Focused Dimension III: Claim Focused Dimension IV: Established Knowledge versus Past Action Focused Dimension V: Ownership Focused Dimension VI: Modified Information Focused

An ANOVA test was conducted and results are shown in Table 4.10. This table summarizes the results of ANOVA test of these mean differences. The details of ANOVA test and a Post Hoc Scheffé tests can be seen in Appendix F. Table 4.11 presents results of ANOVA test on dimensional difference across research article conventional sections in LTRAC.

Table 4.11 Results of ANOVA Test on Dimensional Difference across Research Article Conventional Sections in LTRAC

		Sum of Squares	df	Mean Square	F	p
Dimension I	Between Groups	810.91	3	270.30	19.09	***.000
	Within Groups	1642.46	116	14.16		
	Total	2453.37	119			
Dimension II	Between Groups	775.13	3	258.38	13.17	***.000
	Within Groups	2275.00	116	19.61		
	Total	3050.13	119			
Dimension III	Between Groups	371.08	3	123.69	6.35	***.001
	Within Groups	2258.31	116	19.47		
	Total	2629.39	119			
Dimension IV	Between Groups	1377.41	3	459.14	35.80	***.000
	Within Groups	1487.55	116	12.82		
	Total	2864.96	119			
Dimension V	Between Groups	35.82	3	11.94	1.16	.328
	Within Groups	1192.43	116	10.28		
	Total	1228.24	119			
Dimension VI	Between Groups	204.73	3	68.25	5.29	**.002
	Within Groups	1495.26	116	12.89		
	Total	1700.00	119			

Note: Dimension I: Persuasion Focused Dimension II: Evaluative Stance Focused Dimension III: Claim Focused Dimension IV: Established Knowledge versus Past Action Focused Dimension V: Ownership Focused Dimension VI: Modified Information Focused

* P < .05 ** P < .01 *** P < .001

As shown in Table 4.11, most dimensional differences occur across research article conventional sections in LTRAC. Dimension I, II, III, and IV contained significant value (P) which were less than .001. The P value implied that there were very highly significant differences across conventional sections. Dimension VI contained significant value which was less than .01. The P value implied that there was highly statistically significant difference. Dimension V, where no statistically significant differences were found since its P value is greater than .05. Then, Post Hoc Scheffé tests were conducted to determine where differences occurred in each dimension (Dimension I, II, III, IV, and VI). The results are presented in Table 4.12

Table 4.12 Summary of Multidimensional Intersectional Differences in LTRAC

	(I) section	**(J) section**	**Mean Difference (I-J)**	**Std. Error**	**P**
Dimension I	Introduction	Methods	4.17	.97	***.001
		Results	5.91	.97	***.000
		Discussion	-.02	.97	1.000
	Methods	Results	1.75	.97	.362
		Discussion	-4.19	.97	***.001
	Results	Discussion	-5.93	.97	***.000
Dimension II	Introduction	Methods	2.73	1.14	.135
		Results	-1.28	1.14	.742
		Discussion	-4.35	1.14	**.003
	Methods	Results	-4.00	1.14	**.008
		Discussion	-7.07	1.14	***.000
	Results	Discussion	-3.07	1.14	.071

Table 4.12 (Continued)

	(I) section	(J) section	Mean Difference (I-J)	Std. Error	P
Dimension III	Introduction	Methods	2.81	1.14	.112
		Results	.53	1.14	.975
		Discussion	-2.12	1.14	.328
	Methods	Results	-2.29	1.14	.263
		Discussion	-4.94	1.14	***.001
	Results	Discussion	-2.66	1.14	.149
Dimension IV	Introduction	Methods	9.01	.92	***.000
		Results	5.32	.92	***.000
		Discussion	2.23	.92	.126
	Methods	Results	-3.69	.92	**.002
		Discussion	-6.78	.92	***.000
	Results	Discussion	-3.09	.92	*.014
Dimension VI	Introduction	Methods	1.54	.93	.433
		Results	2.89	.93	*.025
		Discussion	-.40	.93	.979
	Methods	Results	1.35	.93	.552
		Discussion	-1.94	.93	.227
	Results	Discussion	-3.29	.93	**.007

Note: Dimension I: Persuasion Focused Dimension II: Evaluative Stance Focused Dimension III: Claim Focused Dimension IV: Established Knowledge versus Past Action Focused Dimension VI: Modified Information Focused

* P < .05 ** P < .01 *** P < .001

In Dimension I: Persuasion Focused, there were differences across most sections. Very highly statistically significant differences were found between the Introduction and the Methods, the Introduction and the Results, the Methods and the Discussion, and the Results and the Discussion ($P \leq .001$). However, no statistically significant differences were found between the Introduction and the Discussion and between the Methods and the Results ($P > .05$). In Dimension II: Evaluative Stance Focused, there were statistically significant differences across some research article conventional sections. A very highly statistically significant difference was found between the Methods and the Discussion ($P \leq .001$). High statistically significant differences were found between the Introduction and the Discussion and the Methods and the Results ($P \leq .01$). However, no statistically significant differences were found between the Introduction and the Methods, the Introduction and the Results, and the Results and the Discussion ($P > .05$). In Dimension III: Claim Focused, a very highly significant difference was only found between the Methods and the Discussion ($P \leq .001$). In Dimension IV: Established Knowledge versus Past Action Focused, there were statistically significant differences across most research article conventional sections. Very highly statistically significant differences were found between the Introduction and the Methods, the Introduction and the Results, and the Methods and the Discussion ($P \leq .001$). A highly statistically significant difference was found between the Methods and the Results ($P \leq .01$). A statistically significant difference was found between the Results and the Discussion ($P \leq .05$). However, no difference was found between the Introduction and the Discussion ($P > .05$). In Dimension V: Ownership Focused, no statistically significant differences were found across all research article conventional sections ($P > .05$). In Dimension VI: Modified Information Focused, a highly statistically significant difference was found between the Results and the Discussion ($P \leq .01$). A statistically significant difference was found between the Introduction and the Results ($P \leq .05$). However, no statistically significant differences were found between the Introduction and the Methods, the Introduction and the Discussion, the Methods and the Results, and the Methods and the Discussion ($P > .05$).

1) Similarities and Differences among Research Article Conventional Sections in LTRAC

At ease of understanding, Figure 4.8 pictures the bar chart comparing the average dimension scores of research article conventional sections in LTRAC and their similarities and differences.

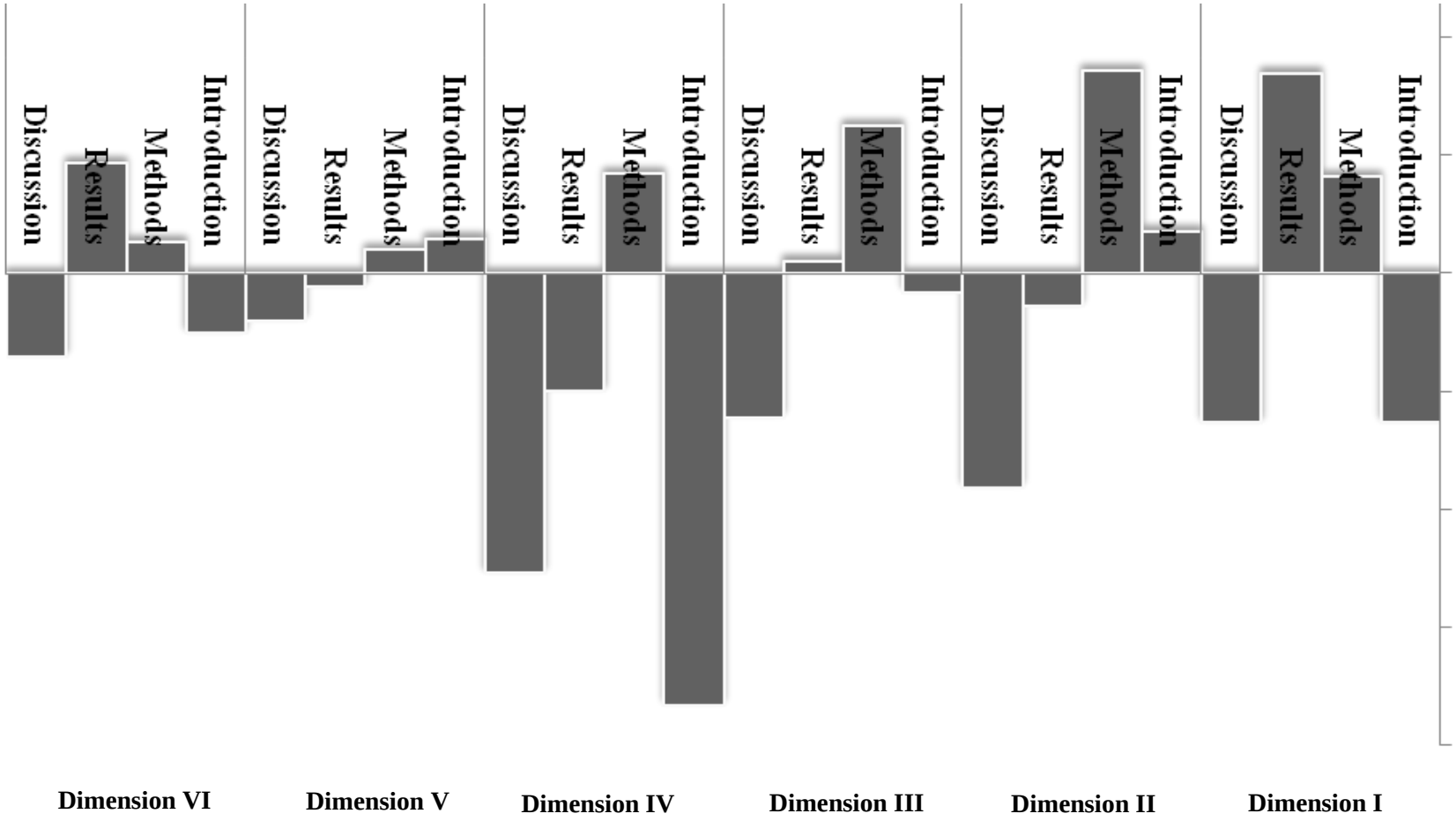

Figure 4.8 The Mean Score of Each Dimension for Each Research Article Conventional Section in LTRAC

Note: Dimension I: Persuasion Focused Dimension II: Evaluative Stance Focused Dimension III: Claim Focused Dimension IV: Established Knowledge versus Past Action Focused Dimension V: Ownership Focused Dimension VI: Modified Information Focused

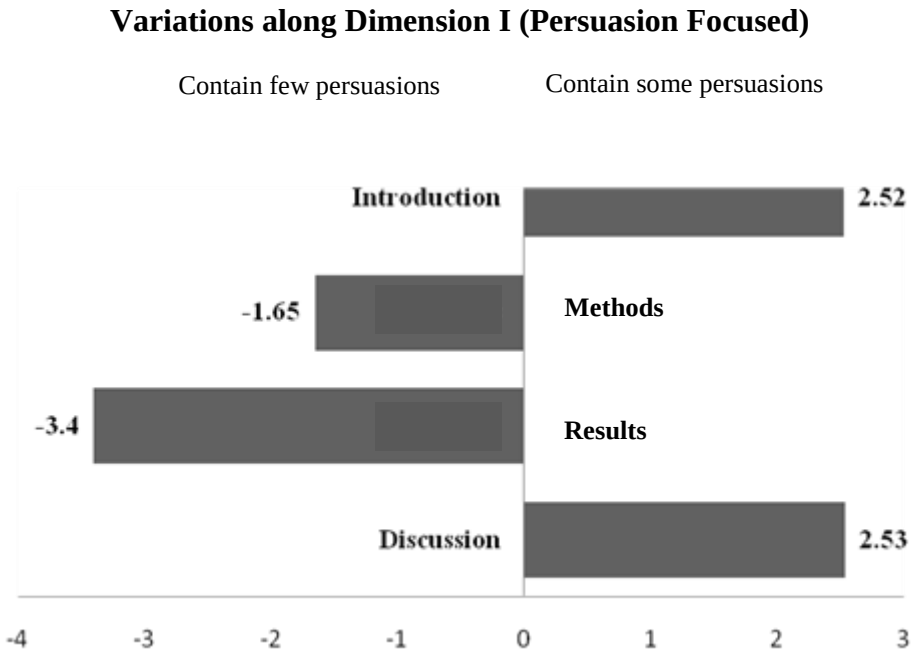

Figure 4.9 The Dimension I Mean Score of Each Research Article Conventional Section in LTRAC

Note: Introductions ≈ Discussions and Methods ≈ Results

Figure 4.9 shows that for Dimension I: Persuasion Focused, the research article writers tended to use Present Perfect Aspects, Split Auxiliaries, Type Token Ratio, Possibility Modal, Adverbs, Infinitives, and That Relative Clauses on Subject Position to provide their persuasion. It is apparent that there were very highly statistically significant differences across most sections ($P < .001$) (between the Introduction and the Methods, the Introduction and the Results, the Methods and the Discussion, and the Results and the Discussion). However, no statistically significant differences were found between the Introduction and the Discussion and between the Methods and the Results.

Evidently, the Introduction and the Discussion contained similar styles of writing. In the Introduction, research article writers describe what the researchers know about the topic before researching, by providing a brief review of the pertinent published literature being available on the subject (Elina, 2011; Redman, 2011; Samraj, 2002). In the Discussion, research article writers compare their results with the findings from other studies, or use other studies to support their claims (Bitchener

& Basturkmen, 2006; Thomas, 2010). In addition, the Discussion and the Introduction contained quite similar mean positive scores (2.53 and 2.52 respectively), indicating the most frequent occurrences of expressing the writers' persuasion to readers.

Text Samples 28-31 illustrate this style and show the use of some co-occurring lexico-grammatical features such as Present Perfect Aspects[1], Split Auxiliaries[2], Possibility Modal[3], Adverbs[4], Infinitives[5], and That Relative Clauses on Subject Positions[6].

Text Sample 28: Discussion section of T45 (F1 score = 16.68)

> …One could[3] argue that ESPj and JEAP are simply[4] making[2] up for a clear lack of qualitative research in the broader-based language teaching and learning journals. As noted, leaders in applied linguistics and ESOL have called[1] for even more qualitative research since the 1990s. It is undeniable that qualitative methods are excellent for exploring the many contextual aspects of ESP, and it is unsurprising that persuasive arguments have been made for even more research that is contextualized as ESP is so context-dependent[6]. Clearly ESP researchers have heeded[1] these calls, and great advances in knowledge about certain areas have been made[1], for example disciplinary discourses, particularly written forms. On the other hand, the small proportion of quantitative research in ESPj and JEAP that is not discourse-based[6] seems unlikely to be[5] the result of a strategy of exclusion. There is, after all, a trickle of such research being published in both journals year by year. It may simply[4] be[2] that researchers are submitting their work to journals that are perceived as more quantitative-friendly[6]. However, as ESPj and JEAP, more than any other journals, represent ESP as a field, an argument might[3]be made for them to actively encourage[5] a broader spectrum of research including quantitative methods…

Text Sample 29: Introduction section of T46 (F1 score = 9.06)

> …These requirements pose significant challenges to even the most seasoned communicators. In the case of BE students, the requirements may[3] look rather daunting and even appear insurmountable. Pedagogical interventions would therefore[4] need[2] to focus on helping students to develop the underlying skills for making decisions about MC. The article first presents a review of the literature that has informed the study[1,6]. Next, a discussion of the main results and the implications for the BE class follows. Based on this discussion, the article features a number of tasks designed from the findings which aim at helping BE students to be better[5] prepared for the MC demands of today's workplace. Through these research-based tasks, the article showcases research-informed pedagogical interventions for the communication class in BE. MC has been defined[1] as the act of holding multiple conversations at the same time . The term 'conversation' is used here in its broader sense, covering face-to-face as well as electronically mediated communication. MC has increasingly become[1,2,4] a frequent occurrence in internal and external communication practices across corporations that heavily[4] rely on technology for their communication needs[6], despite a number of studies having pointed to the need for communicators to train[5] themselves to avoid[5] communication overload …

As seen in the Text Samples 28-29, the Discussion and the Introduction were similar in that they contained a lot of positive lexico-grammatical features loading on this dimension. Both contained positive dimension scores (16.68 and 9.06 respectively) implying that the positive lexico-grammatical features co-occurring in this dimension were frequently found in the sections, with persuasions frequently mentioned in these two sections. The results are in accordance with several scholars (e.g. Bitchener & Basturkmen, 2006; Getkham, 2010; Hess, 2004; Hirano, 2009; Kanoksilpatham, 2003; Kretchmer, 2008; Redman, 2011; Samraj, 2002; Sauaia, 2013; Schafer, 2009; Swales & Feak, 2004) in that research article writers frequently present their persuasions in the Discussion and the Introduction.

Text Sample 30: Methods section of T36 (F1 score = -7.64)

…To examine[5] the process of collaborative writing, I followed Yingxue's group and Mark's group in the fall semester of 2003 and Wenzhen's group in the spring semester of 2004. Table 3 summarizes the amount and sources of data collected. I attended all their group discussions (14 in total), which were recorded with permission, and conducted in-depth interviews with each participant individually[4] one to four times at their convenience. I also collected e-mail exchanges between group members and did e-mail interviews with Hoa, Ming, Qing, and Tong due to time conflict. Other sources of data, such as field notes from group meetings and classroom observations, interviews with the instructors and the teaching assistant, course materials and multiple drafts of the assignments, were used to document[5] the context. A guide consisting of open-ended questions formed the basis of the interviews with the students and their instructors. The interview questions to the students outlined a set of issues related to collaborative writing such as their learning goals, their approaches to the tasks, their negotiations, the role of their L1, and their perceived learning outcomes. The interview questions to the instructors covered the topics of (1) characteristics of the course, (2) purposes of group-project assignments, (3) writing requirements and related evaluation criteria, (4) assistance provided to the students, and (5) comments on the participating students' group assignments. Interviews and group discussions were transcribed verbatim in the original language used (Chinese and English). Quotations presented in this article in italics were originally spoken or written[2,4] in Chinese, whereas those in regular typeface were originally spoken or written[2,4] in English (and the latter are presented verbatim, without correction of grammar errors). Adopting the qualitative research methods of analytic induction and constant comparison, I read the data iteratively[4], searching for recurrent and salient themes or patterns in their engagement in group tasks and validating my interpretations through constant comparison between different pieces of data. The participants also offered their feedback on the accuracy and plausibility of my interpretations over the course of this study…

Text Sample 31: Results section of T53 (F1 score = -10.02)

> …To address[5] the hypothesis that L2 proficiency modulates the nativelikeness of focus processing, additional ANOVAs were separately performed[2,4] on the L2 French data using L2 proficiency (as determined by the averaged speaking, reading, listening, and pronunciation scores on the LEAPQ) as a continuous covariate. The midline ANOVA showed no significant main effect of focus condition, F (1, 22) = 1.461, p = .24, partial 2 = .062, nor was there a significant interaction of focus condition and L2 proficiency, F (1, 22) = 2.580, p = .122, partial ? 2 = .105...

As seen in the Text Samples 30-31 taken from the Methods and the Results, these sections were similar in that they contained few positive lexico-grammatical features loading on this dimension and contained negative dimension scores (-7.64 and -10.02 respectively). These dimension scores implied that these two sections contained little or no focus on persuasion because of the absence of the positive lexico-grammatical features of Dimension I. As scholars (Bitchener & Basturkmen, 2006; Redman, 2011; Samraj, 2002) stated, in the Methods and the Results, research article writers frequently focus on presenting research procedures and findings rather than expressing their persuasion.

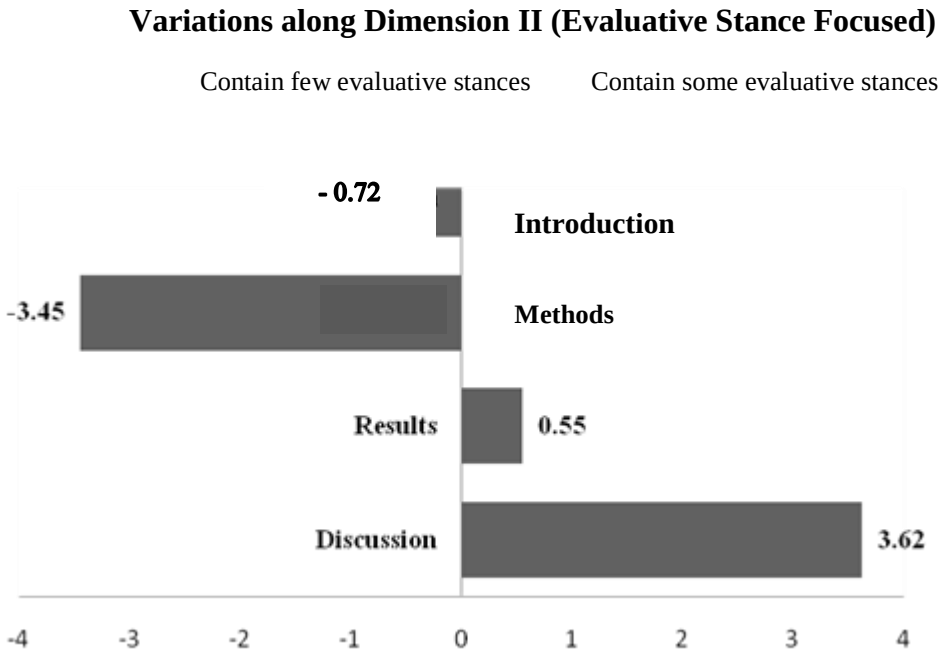

Figure 4.10 The Dimension II Mean Score of Each Research Article Conventional Section in LTRAC

Note: Introductions ≈ Methods, Introductions ≈ Results, and Results ≈ Discussions

Figure 4.10 presents that for Dimension II: Evaluative Stance Focused, the research article writers tended to use Predicative Adjectives, Be as Main Verbs, Analytic Negations, Downtoners, Emphatics, Demonstrative Pronouns, Predictive Modals, and Adverbs to express their evaluative stances. Obviously, there were no statistically significant differences between the Introduction and the Methods, between the Introduction and the Results, and between the Results and the Discussion. However, the positive mean dimension scores were for the Discussion and the Results (3.62 and 0.55 respectively) suggesting that the research article writers focused on expressing evaluative stances in these two sections while the negative mean dimension scores was for the Methods and the Introduction (-3.45 and -0.72 respectively) suggesting no evaluative stances in these two sections. Presumably, the research article writers frequently evaluated their own findings and compare them with others in the Discussion and sometimes in the Results of language teaching research articles.

Text Sample 32-35 illustrate the use of some co-occurring lexico-grammatical features such as Predicative Adjectives[1], Be as Main Verbs[2], Analytic Negations[3], Downtoners[4], Emphatics[5], Demonstrative Pronouns[6], Predictive Modals[7], and Adverbs[8].

Text Sample 32: Discussion section of T56 (F2 score = 17.59)

…For over a century, some spelling experts and theorists have argued that spelling should not[3] be directly and systematically[8] taught, claiming that such instruction is[2] not[3]effective or efficient[1] . The findings from this meta-analysis did not support these claims. In terms of effectiveness, we consistently[8] found that formal spelling instruction improved students' spelling performance. First, when compared to a no treatment or unrelated treatment control (e.g., math instruction), direct and systematic spelling instruction resulted in slightly[4] more than one-half of a standard deviation of improvement in students' spelling skills. These positive effects occurred with students in kindergarten to grade 10. Second, increasing the amount of formal spelling instruction students in grades 1-10 received further enhanced their spelling skills, resulting in seven tenths of a standard deviation gain in spelling performance. For the first comparison (spelling instruction vs. no/unrelated instruction), an average student would[7] move from the 50th percentile to the 71st percentile as a result of formal spelling instruction, whereas additional spelling instruction (the second comparison) would[7] move a typical student from the 50th percentile to 76th percentile. The case for the effectiveness of formal spelling instruction was further strengthened by the finding that the spelling gains made by students were maintained over time. These gains were[2] similar[1] in magnitude to the gains observed immediately[8] following instruction (i.e., about one-half of a standard deviation), suggesting that the effects of such instruction were durable over a short period of time (1 week to 6 months). Nevertheless, additional research is needed, as longer term maintenance effects are unknown, just six studies assessed maintenance effects, and these studies only[4] involved students in kindergarten through grade 3. Additional and crucial support for the effectiveness of formal spelling instruction was the finding that teaching

spelling resulted in more[5] correct spelling in students' writing. Collectively[8], the studies that addressed this issue produced almost a full standard deviation gain in correct spelling in writing. As a result, an average student would move from the 50th percentile on such measures to the 83rd percentile. This[6] is[2] particularly[8] important[1], as previous research has demonstrated that spelling errors in a composition have a negative effect on the reader. They judge the content of a paper more[5] harshly[8] when such errors are[2] present…

Text Sample 33: Results section of T31 (F2 score = 13.10)

…The interrater reliability rates are provided in Table 2. The findings were[2] generally[8] not[3] surprising[1]. The reliability coefficients of the holistic scores were[2] lower[1] than those found in Sasaki and Stevenson, Schoonen, and de Glopper, but none of the other studies reported reliability on the accuracy portion of the holistic scores. The reliability of the holistic scores is[2] much[5] higher[1] than in Polio. But note again that the holistic scales here did not[3] focus exclusively on accuracy and included other aspects of writing that may have been easier[1] to assess. Also, the group of students in this study was[2] more[5] heterogeneous[1] than the group used in Polio. The reliability coefficient of .88 on the error-free T-units is[2] also[8] higher[3] than was found in Polio but lower than in Arslanyilmaz and Pederse, who used error-free T-units, and lower than in Evans et al., who used error-free clauses. The reliability of the number of errors count was[2] very[5] similar[1] to the error-free counts at .89 and was[2] quite a bit[4] higher[1] than the studies listed in Table 1. One possible reason for our higher reliability was the elimination of problematic T-units, mentioned above, from the analysis, thus avoiding a situation where one rater coded the whole T-unit as a single error while a second rater counted six errors. Not[3] surprisingly[8], the reliability of specific error types, particularly lexical errors, was lower. What we did find[5] surprising was that the weighted T-unit measure was[2] not[3] more reliable[1] than the error-free unit measures...

As seen in the Text Samples 32-33, the Discussion and the Results contained a lot of positive lexico-grammatical features loading on Dimension II and presented positive dimension scores (17.59 and 13.10 respectively). It can be argued that there were a lot of evaluative stances used in these two sections, presumably, due to the writers' systematical discussion, comparison and evaluation of their findings. This is in line with several scholars (e.g. Hess, 2004; Kretchmer, 2008; Sauaia, 2013; Schafer, 2009) in that research article writers discuss and evaluate the findings of other studies to support their results and in turn highlights how and in what ways their study differs from others in the Discussion and sometimes in the Results.

Text Sample 34: Introduction section of T34 (F2 score = -9.15)

> …Teacher-administered error correction in students' second language writing has been a topic of considerable interest and some controversy over the past several decades, due principally[8] to Truscott's provocative denunciation of the practice as futile and potentially[8] harmful. Since Truscott made that claim, many have countered that error correction is not only needed and expected by the learners but also, in some cases, a pedagogically[8] sound practice. The central issue in the arguments for and against error correction in L2 writing has focused on whether or not writing improves as a consequence of corrective feedback. To some extent, the controversy surrounding this[6] issue can be attributed to the difficulty of defining and measuring what is meant by improvement. This[6] difficulty can be explained, in part, by the fact that writing is[2] a multifaceted, complex process and product. Given this[6] complexity, defining what constitutes improvement needs to be analyzed from various perspectives. For instance, though L2 writing used in authentic contexts is usually[8] evaluated holistically[8] for its overall communicative effect, it often is not evaluated by its constituent parts; however, important reasons do exist for analyzing L2 writing in terms of its discrete components such as fluency, complexity, rhetorical appropriateness, communicative adequacy, and linguistic accuracy. Since fluctuations in one component, such as fluency or complexity, might be associated with various fluctuations in another, such as

accuracy, each component of writing requires a separate and valid measurement to identify change...

Text Sample 35: Methods section of T36 (F2 score = -8.32)

…To examine the process of collaborative writing, I followed Yingxue's group and Mark's group in the fall semester of 2003 and Wenzhen's group in the spring semester of 2004. I attended all their group discussions (14 in total), which were recorded with permission, and conducted in-depth interviews with each participant individually[8] one to four times at their convenience. I also collected e-mail exchanges between group members and did e-mail interviews with Hoa, Ming, Qing, and Tong due to time conflict. Other sources of data, such as field notes from group meetings and classroom observations, interviews with the instructors and the teaching assistant, course materials and multiple drafts of the assignments, were used to document the context. A guide consisting of open-ended questions formed the basis of the interviews with the students and their instructors. The interview questions to the students outlined a set of issues related to collaborative writing such as their learning goals, their approaches to the tasks, their negotiations, the role of their L1, and their perceived learning outcomes. The interview questions to the instructors covered the topics of (1) characteristics of the course, (2) purposes of group-project assignments, (3) writing requirements and related evaluation criteria, (4) assistance provided to the students, and (5) comments on the participating students' group assignments. Interviews and group discussions were transcribed verbatim in the original language used. Quotations presented in this[6] article in italics were originally[8] spoken or written in Chinese, whereas those in regular typeface were originally[8] spoken or written in English. Adopting the qualitative research methods of analytic induction and constant comparison, I read the data iteratively[8], searching for recurrent and salient themes or patterns in their engagement in group tasks and validating my interpretations through constant comparison between different pieces of data. The participants also offered their

feedback on the accuracy and plausibility of my interpretations over the course of this[6] study...

As seen in the Text Samples 34-35, the Introduction and the Methods were similar in that they presented few positive lexico-grammatical features loading on this dimension. These two sections showed negative dimension scores (-9.15 and -8.32 respectively) both of which were far smaller than the Discussion and the Results. These scores implied that these two sections contained little or no focus on presenting evaluative stances due to the absence of positive lexico-grammatical features in Dimension II of LTRAC. This is in line with several researchers (e.g. Azevedo et al., 2011; Butin, 2010; Burton, 2008; Brett, 1994; Carter, 2012; Kretchmer, 2003; Lunenburg, 2008; Redman, 2011; Samraj, 2002; Swales & Feak, 2004) in that research article writers present significances of their research studies in the Introduction and explain research procedures in the Methods. Interestingly, the findings showed that the research article writers of language teaching research articles tended to present less evaluations in the Introduction than ones of nursing research articles since the research article writers of the language teaching try to convince the readers to realize why their studies are significant more than to try to evaluate other studies in the field (Samraj, 2002; Swales & Feak, 2004).

Variations along Dimension III (Claim Focused)

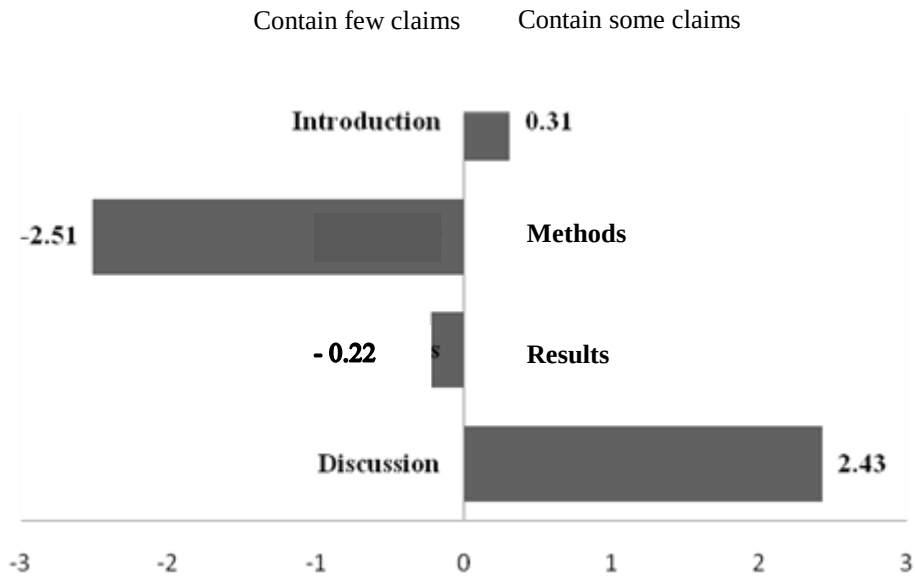

Figure 4.11 The Dimension III Mean Score of Each Research Article Conventional Section in LTRAC

Note: Introductions ≈ Methods, Introductions ≈ Results, Introductions ≈ Discussions, Methods ≈ Result, and Results ≈ Discussions

Figure 4.11 presents that for Dimension III: Claim Focused, the research article writers used Suasive Verbs, the Pronoun It, That Verb Complements, Private Verbs, Wh Relative Clauses on Subject Positions, That Deletion, and Adverbial Subordinators to demonstrate claims in texts. Obviously, there were no statistically significant differences found between the Introduction and the Methods, the Introduction and the Results, the Introduction and the Discussion, the Methods and the Results, and between the Results and the Discussion. However, the positive dimension scores for the Discussion and the Introduction (2.43 and 0.31 respectively) suggested that the research article writers tended to focus on claims in these two sections while the negative dimension score for the Methods and the Results (-2.51 and -0.22 respectively) implied no or few claims. Presumably, the research article writers frequently claim the importance of their results in the Discussion and the Introduction of language teaching research articles.

Text Samples 36-39 illustrate the use of some co-occurring lexico-grammatical features such as Suasive Verbs[1], the Pronoun It[2], That Verb Complements[3], Private Verbs[4], Wh Relative Clauses on Subject Positions[5], That Deletion[6], and Adverbial Subordinators[7].

Text Sample 36: Discussion section of T44 (F3 score = 11.90)

…In addition to using a separate introductory section for citing the important published results following the start of the introduction section, a prevalent activity in all introductory material is 'establishing[4] presumptions', leading us to hypothesize both activities as central to mathematical argument. Anthony originally proposed[1] incorporating 'definition' into the CARS model. However, Anthony characterized definition as parenthetical explanation in his work on software engineering, suggesting[1] that[3] this activity performs different roles among disciplines. Our data indicates[4] that[3] in mathematics definition is crucial to constituting the abstract concepts at the heart of this field, making it [2] central to contextualizing research and contributing to comprehension and persuasion in this field. As such, we argue that[3] definition (in its[2] broader manifestation, 'establishing presumptions') warrants status as a 'move' in the mathematics RAs based on four points. First, the prevalence of Mp in the corpus, as well as its[2] use as an initiating move, suggests[1] ~~that~~[6] it[2] is central in mathematics RAs. Second, it[2] enables mathematicians to share understanding of the objects discussed. Third, it[2] surpasses shared understanding by affording the basis for new insights in mathematics. And fourth, by establishing[4] agreement about mathematical concepts it[2] enables argument, making it central to constructing knowledge in mathematics. The prevalence of Mp in the corpus should be examined in light of disciplinary assumptions about knowledge in mathematics. First, M3 is the most frequently used move in the corpus (32%), suggesting[1] that[3] mathematicians prefer[1] presenting their work to either establishing[4] its[2]importance and generality or highlighting the need for new research. This observation aligns with Morgan's view that because theoretical mathematicians work on original problems, they expect their audiences "to be genuinely interested in knowing the results and to need to be persuaded of the

correctness of the results". But Mp is the second most prevalent move (30%), as well as the second most prevalent initiating move (43.3%). Jamison explains the historical precedent of Mp as an initiating move: There is a nearly universally accepted logical and rhetorical structure to mathematical exposition. For over two millennia serious mathematics has been presented following a format of definition-theorem-proof. Euclid's Elements from circa 300 bc codified this mode of presentation which is still used today in journal articles and advanced texts[5]. While[7] the latter knowledge is probably best gained by students working with research supervisors, writing instructors should ensure that their students understand how generic conventions in any field are always driven by disciplinary assumptions about knowledge. Bazerman further argues that students must develop their critical faculties, "for learning academic writing entails learning to wield tools of symbolic power for immediate rhetorical purposes". This study has applied a critical lens to genre analysis to highlight how the processes of knowledge creation in mathematics shape the structure and argument of its RAs…

Text Sample 37: Introduction section of T47 (F3 score = 5.59)

…The group oral format has emerged as a possible solution to the need for a test of second language (L2) speaking ability which[5] assesses a test taker's ability to engage in a discussion. In this format, a small group of three or more test takers is expected to discuss a topic without support or interference from a test examiner. This oral assessment format may also be amenable to English for Specific Purposes (ESP) situations, such as for an English for business communication program. These ESP contexts require[1]assessments that measure a test taker's content knowledge of a given field of study as well as the test taker's oral language proficiency. The emergence of the group oral has been due in part to the increasing criticism of test tasks which[5] include only an examiner and a test taker, such as the one-on-one oral interview, for yielding discourse which[5] is controlled by the examiner. This one-on-one format makes it[2] unreasonable to infer the degree to which test takers can engage in a

discussion with peers as they commonly would in the real world or the language classroom. A group oral assessment format may be more appropriate for assessing this ability to engage with peers. Moreover, the group oral format may make it[2] possible to measure knowledge of a content domain and a more defensible construct of oral ability, one which[5] includes interactional competence as well as more traditional measures of oral ability such as comprehensibility, fluency, grammar, and vocabulary. Two specific concerns about the degree to which the group oral can provide opportunities for test takers to demonstrate their abilities to discuss a topic have been raised. The first is that test takers could choose to pay little attention to what others in the group are saying, opting instead to plan what they will say next. This might be of particular concern in English for Specific Purposes (ESP) contexts in which learners have focused on learning content about a particular subject matter domain as well as field-specific vocabulary and are expected to demonstrate their abilities to use this knowledge on an assessment as well as their oral language ability. If test takers did choose to ignore what others say, the resulting discourse would likely not provide an indication of the extent to which test takers could participate in a discussion in which they actively connect what they say to what others say in a pertinent manner. As a result, it[2] would be expected[4] that[3] the discourse would not have a pattern of mutual contingency, a pattern in which the talk is determined[1] partly by each group member's preinteraction plans and partly by the other members' talk. If the elicited discourse were composed of disconnected monologues, it[2] may be that the targeted content knowledge can be appropriately assessed, but a test taker's interactional competence, an important aspect of oral ability, cannot. On the other hand, discourse with a mutual contingency pattern might suggest[1] ~~that~~[6] both content knowledge and oral ability, including interactional competence, can be effectively assessed by a group oral…

As seen in the Text Samples 36-37, the Discussion and the Introduction were similar in that they contained the positive lexico-grammatical features loading on Dimension III. Both Text Samples contained positive mean dimension scores

(11.90 and 5.59 respectively) implying claims were frequently found in these two sections. This might be because research article writers argue how their results would be benefit in the Introduction and discuss the meanings of their findings and why they believe their findings are significant in the Discussion (Eliana, 2009; Hess, 2004; Kretchmer, 2008; Redman, 2011; Samraj, 2002, Sauaia, 2013; Schafer, 2009; Swales & Feak, 2004)

Text Sample 38: Results section of T42 (F3 score = -10.38)

…The direction of the expected discrimination effect is reversed for Experiments 1 and 2, which tested 5-month-olds, versus Experiments 3 and 4, which tested 7-month-olds. That is, in 5-month-olds, discrimination is found[4] with longer looking times for the familiarized accent (familiarity effect, Exp1) whereas[7] 7-month-olds prefer[1] to listen to novel accent (novelty effect, Exp3). This reversal accords with Houston-Price and Nakai's review of the factors influencing novelty versus familiarity effects in HPP-related procedures. Habituation becomes faster as children age, which would lead to a better representation of the familiarized accent in 7-month-olds, which in turn leads to a greater reaction to novelty…

Text Sample 39: Methods section of T39 (F3 score = -12.65)

…The study reported on in this article was carried out in an intact second-semester French class taught by the second author at a private research university in the northeastern United States during the Spring 2013 academic term. Thirteen students were enrolled in the course at the beginning of the semester, and all consented to be part of the study.2 However, not all students completed all of the assignments from which we draw data, meaning that [3] in the analysis presented below, the figures do not always include 13 participants. The semester was divided into four parts for intervention (or what we refer to as the enrichment program) and data collection: pre enrichment (weeks 3-4), enrichment 1 (weeks 5-7), enrichment 2 (weeks 8-10), and postenrichment

> (weeks 11-12). We adapted van Compernolle's framework for concept-based pragmatics instruction, originally carried out in the context of one-on-one tutoring sessions, for use in the course, focusing specifically on the French T/V system. All tasks and materials were designed to complement the themes addressed in the course textbook. During preenrichment and postenrichment, which will be the focus of our analysis below, students completed three different tasks: a language awareness questionnaire, an appropriateness judgment task (AJTs), and strategic interaction scenarios. Details about these tasks and analytic procedures will be provided as we present the findings below…

As seen in the Text Samples 38-39, the Results and the Methods were similar in that they contained few positive lexico-grammatical features loading on this dimension. Their dimension scores were low and negative (-10.38 and -12.65 respectively). These scores indicated that the research article writers expressed their claims less frequently in these two sections. According to scholars (e.g. Azevedo et al., 2011; Butin, 2010; Carter, 2012; Lunenburg, 2008), research article writers present their claims less frequently in the Results and the Methods than the other two sections.

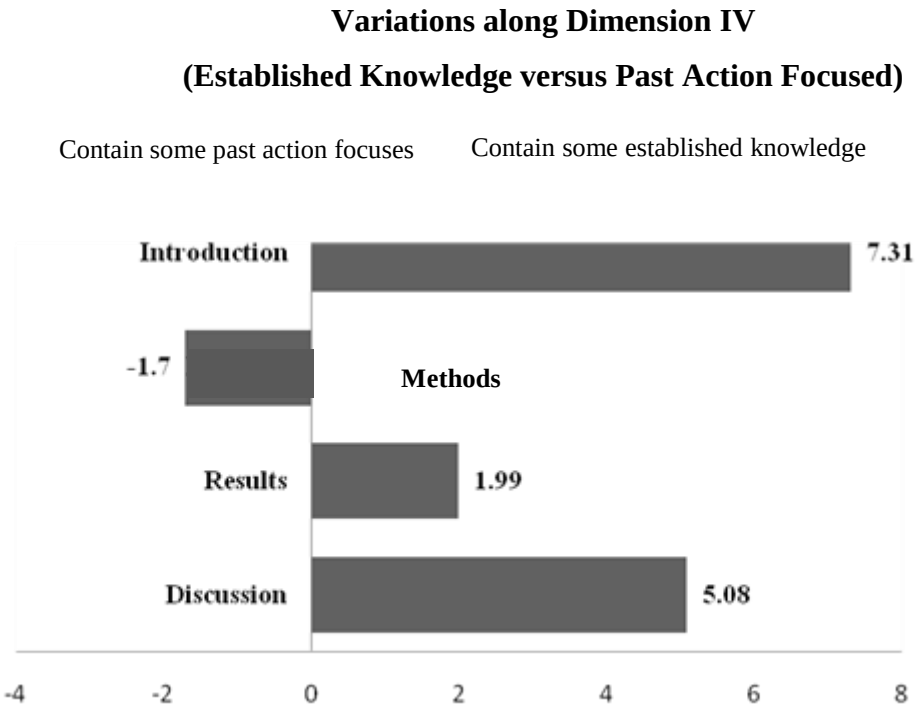

Figure 4.12 The Dimension IV Mean Score of Each Research Article Conventional Section In LTRAC

Note: Introductions ≈ Discussions

Figure 4.12 shows that for Dimension IV: Established Knowledge versus Past Action Focused, the research article writers tended to use the Present Tense, Conjuncts,That Verb Complements, Attributive Adjectives, and Phrasal Coordinations to talk about established knowledge and used Past Participial WHIZ Deletion Relatives, Past Tense, and Agentless Passives to talk about past action. Obviously, there were statistically significant differences across most research article conventional sections. However, there were no statistically significant differences found between the Introduction and the Discussion.

Subsequently, the Introduction and the Discussion contained similar styles of writing. Presumably, in the Introduction and the Discussion, the research article writers discussed established knowledge to specify the research gap that needs fulfilling and therewith discussed the findings whether they are similar or different with established knowledge, while in the Methods, the writers explained what

procedures they had used in their studies. The findings are in line with scholars (e.g. Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003). However, Baoya labeled this kind of discourse ‘Current Information versus Procedural Concern’, whereas Getkham named this as ‘Expression of Generality’, while Kanoksilpatham labeled this ‘Attributed Knowledge versus Current Finding’

Text Samples 40-42 illustrate the use of some co-occurring positive lexico-grammatical features such as Present Tense[1] Conjuncts[2], That Verb Complements[3], Attributive Adjectives[4], and Phrasal Coordinations[5].

Text Sample 40: Introduction section of T33 (F4 score = 10.94)

> …Today, it is[1] a well-documented[4] fact that the number of multilingual[4] students pursing graduate degrees in the U.S. is steadily increasing.1 The nature of the graduate degree in the North American context is[1] usually such that students are[1] expected to be active[4] participants of their disciplinary communities and[5] constructors of new[4] knowledge as they progress[1] through their degree. One of the key academic[4] literacy practices these students engage with is[1] thesis/ dissertation writing, which is[1] an arduous[4] task regardless of students' linguistic[4] background. Much second language writing research in the last[3] decade has focused on the academic[4] writing practices of mature[4] multilingual[4] writers, especially the negotiation processes and[5] academic[4] socialization practices they go though in writing a thesis/ dissertation. The term "multilingual[4] writers" in the literature is[1] often equated with English as a Second Language (ESL) writers who exclusively engage in writing in their L2,2 not those who are already highly literate in multiple[4] languages. The findings reveal[1] that[3] the participants resisted certain academic writing requirements in English which clashed with their L1 writing experiences, but they eventually created hybrid voices and identities as they continued through their doctoral study. By analyzing their self-reports on voice in L2 writing, the authors suggest[1] that[3] 'an increased emphasis on voice as an analytic tool…

Text Sample 41: Discussion section of T40 (F4 score = 10.76)

> …Our findings have shown that[3] the learners' awareness of the French T/V system was enhanced as they appropriated the three concepts around which the enrichment program centered. Most notably, we have documented a shift from rule-of-thumb-based thinking to a focus on meanings and the consequences of making particular meanings through second-person address practices. We have also shown the notable change from accepting, and at times expecting, asymmetrical T/V use in contexts in which there is a power difference to a preference for establishing and maintaining reciprocal V relationships. This was particularly evident in the AJTs and formal strategic interaction scenarios…We extend[1] this claim by adding that the ZPOD turns[1] back on itself in that communicative[3] development has[1] the potential to feed back into the development of abstract[3] concepts and[5] problem-solving abilities. For example, Adan's shift from T to V as a means of aligning with his interlocutor during the performance of a scenario, we argue[1], was a very salient example of online problem solving during communicative[3] performance, which potentially, if indirectly, also affected his abstract conceptual[3] knowledge. Thus[2], in short, while we have presented the outcomes of the study in terms of conceptual[3] knowledge, problem solving, and performance in separate sections, we believe[1] that they form together an integral whole…

Text Samples 40 and 41 belonged to the Introduction and the Discussion. Both contained high positive dimension scores (10.94 and 10.76 respectively) implying that established knowledge was frequently found in these two sections. This is in line with numerous scholars (e.g. Redman, 2011; Samraj, 2002, Swales, 2004; Swales & Feak, 2004) in that research article writers argue the current state of knowledge, consensus, and practice, describe phenomena, or relate what has been found with who has found it in the Introduction and relate their findings to those found in other similar studies in the Discussion.

Text Sample 42: Results section of T47 (F4 score = 3.81)

> …The way in which topics were established indicates[1] that[3]this discourse displayed features of mutual[4] contingency. That is, the discourse pattern developed was partly determined by preinteraction plans and partly by the conversational[4] behavior of the other participants. Speakers tended to nominate a number of topics in one turn, so it was often not clear whether a topic was established until many lines later, and usually after a number of topic nominations or renominations. This pattern is somewhat expected in academic[4] discourse because participants commonly nominate more than one topic to support their views. Other participants have a tendency to establish these topics by addressing them one at a time. This pattern is indicated in the ordering of the respondents' establishment of the topic in the fifth column…

Text Sample 42 was taken from the Results. Though its dimension score was also positive (3.81), significant differences between the Results and Discussion as well as the Results and the Introduction implies that the writing styles between the Results and the Introduction as well as the Discussion sections are quite different.

Text Sample 43 illustrates the use of the negative lexico-grammatical features co-occurring on this dimension such as Past Participial WHIZ Deletion Relatives[1], Past Tense[2], and Agentless Passives[3].

Text Sample 43: Methods section of T37 (F4 score = -6.88)

> …Sixty adult native speakers of English, Mandarin, and Korean (n = 20 per language) participated in the native language study. All of the English- and Mandarin-speaking participants and 8 of the Korean-speaking participants were recruited [2,3]in Cambridge, UK. Twelve Korean participants were recruited[2,3] by the researcher in South Korea when not enough Korean-speaking candidates could be found[3] in Cambridge. The native English speakers were[2] either English teachers working at language schools in Cambridge or students of Cambridge University. The native Mandarin and Korean speakers were[2] either students at language schools in Cambridge or students of Cambridge

University, with the exception of the twelve participants recruited[1] in Korea, who were[2] students at a private university. While the English level of the Mandarin and Korean participants in the native study was not tested[2,3], an effort was made[2,3] to include participants who appeared [2]to have a high level of…

As seen in the Text Sample 43, the Methods contained several negative lexico-grammatical features co-occurring on Dimension IV of LTRAC (Past Participial WHIZ Deletion Relatives, Past Tense, and Agentless Passives). The dimension score were -6.88 implying that the research article writers talked about past action more frequently in this section than the other three sections. This is in line with scholars (e.g. Azevedo et al., 2011; Butin, 2010; Lunenburg, 2008, Susan, 2012) in that research article writers use past tense with passive voice to explain how the data was collected or generated and analyzed in the Methods.

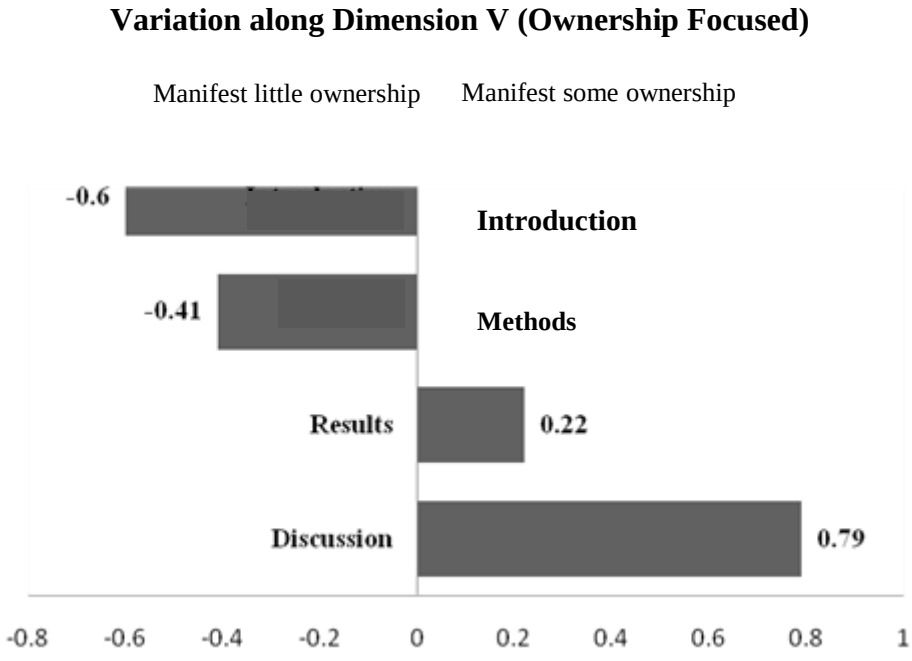

Figure 4.13 The Dimension V Mean Score of Each Research Article Conventional Section In LTRAC

Note: Introductions ≈ Methods ≈ Results ≈ Discussions

Figure 4.13 shows that for Dimension V: Ownership Focused, the research article writers tended to use First Person Pronouns, Public Verbs, Third Person Pronouns, Causative Adverbial Subordinators, and That Deletion to exhibit the writers' ownership.

Understandably, there were no statistically significant differences found among all the research article conventional sections. It can be assumed that all of the sections contained similar styles of writing. However, the Discussion and the Results contained positive dimension mean scores (0.79 and 0.22 respectively). In these two sections, the research article writers tended to present and discuss their findings through the frequent use of first person pronouns ('we', 'our', and 'us') and refer to their investigated population through the use of third person pronouns ('they', 'them', and 'their').

Text Samples 44-47 illustrate the use of some co-occurring lexico-grammatical features such as First Person Pronouns[1], Public Verbs[2], Third Person Pronouns[3], Causative Adverbial Subordinators[4], and That Deletion[5].

Text Sample 44: Discussion section of T31 (F5 score = 5.07)

> …On one hand, we[1] have reported[2] the reliability of a variety of measures, including one new measure. On the other hand, we [1]cannot report[2] that the situation regarding the reporting of the reliability of the various accuracy measures has changed much. With regard to validity, the results of this study do not suggest ~~that~~[5] any one measure of accuracy is more valid than any other. We[1] expand on these issues below, first addressing implications for research and then addressing issues related to development, which can also be tied back to the implications for research. We[1] end with a discussion of pedagogical implications. Implications for research using accuracy measures The interrater reliability coefficients of all the measures except for the specific error types were higher than .84, so it does not seem that any should be excluded from use in research on the basis of difficulty achieving reliability. Nevertheless, very specific guidelines and rater norming need to developed and reported[2]. Often, decisions need to be made about what constitutes an error and what does not.

For example, should spelling errors be included? This choice could significantly affect a writer's accuracy score. Should the use of who instead of whom for an object relative clause be considered an error in written register? Researchers must explain and report[2] these decisions. In addition to reporting guidelines, journal editors must require researchers to report[2] reliability. We[1] were very surprised at the lack of reported reliability in the current studies. The field needs to require more rigorous research design and reporting so that readers can evaluate and replicate studies. One reviewer of this article, however, commented that some types of errors are very straightforward to code and that studies limiting their investigation to one particular structure, such as subject-verb agreement, might not need two coders. In fact, subject-verb agreement is very difficult to code because[4] often if it's not clear if the intended subject is plural or singular. In addition there are dialect variations (The group is vs. the group are) and register variations (There's three people vs. There are three people). Furthermore, subject-verb agreement errors are very easy to miss, so having a second coder ensures that the error is more likely to be noted at least once. While we[1] do think ~~that~~[5] all data need to be coded by two raters, we[1] acknowledge that the difference made by having one, two, or more raters is an empirical question worth investigating further. Because[4] the actual reliability figures do not suggest one measure over another, researchers need to be aware of the strengths and weaknesses of each measure. Conversely, if lower proficiency students are writing shorter sentences, they[3] might actually be able to achieve higher scores on an error-free T-unit measure than more advanced students, so it is not clear if a universal index of accuracy is possible. Even if we[1] had found that some measures showed development better than other measures, we[1] would not have been able to extend our[1] findings to very low or high level students...

Text Sample 45: Results section of T31 (F5 score = 3.80)

As expected, there were fairly high correlations (between .70 and .84) among the error measures (EFT/T, EFC/C, Err/W, and weighted EFTs), which is to be expected because[4] they are not independent. In addition, the correlation between the two holistic measures was .77. A high correlation is also expected here not only because[4] the two constructs are probably related but because[4] other aspects of writing, such as length, can influence raters on all subscores of an analytic rating scale. The holistic language use measure correlated better with Err/W than with the other error measures. We[1] had expected a better correlation with weighted EFTs because[4] that measure took into account comprehensibility, so this was somewhat surprising. Also surprising was the lack of a significant correlation between the number of lexical errors and the vocabulary holistic score. Recall, however, that reliability of the number of lexical errors was very low. The results of the change over time analysis are shown in Table 4. Using a repeated measures ANOVA, we[1] found an increase from time 1 to time 2, which was maintained[2] at time 3, for both the holistic language use and vocabulary scores (Language: $F = 14.83$, $p < .001$, $h2 = .21$; Vocabulary: $F = 35.01$, $p < .001$, $h2 = .38$). None of the error-free unit measures showed any change over time, and in fact, although not significant, there was a pattern of decreasing accuracy. Of the error count measures, preposition errors were the only type of errors that showed any change, a decrease (i.e., improvement) from time 1 to time 2 ($F = 6.76$, $p = .01$, $h2 = .11$) and time 1 to time 3 ($F = 3.94$, $p = .05$, $h2 = .05$). Finally, we[1] checked to see if there was any difference between the group of students that the raters said[2] showed improvement and the group that the raters determined had not. There was no significant interaction effect between time and improvement on any of the errors measures, but there was on the vocabulary subscore.

Text Samples 44-45 belonged to the Discussion and the Results, containing positive dimension scores (5.07 and 3.80 respectively) implying the writers' ownership frequently found in these two sections. This might be because

when the research article writers wanted to present their finding, they tried to manifest their ownership through the uses of first person pronouns (exclusive ‘we’,‘us’, and ‘our’). The findings is in line with scholars (e.g. Redman, 2011; Samraj, 2002, Swales, 2004; Swales & Feak, 2004) in that a first person pronoun (exclusive ‘we’) is used to implicitly express ownership in research articles particularly in the Results and the Discussion sections.

Text Sample 46: Methods section of T41 (F5 score = -5.11)

> …The data were collected from 564 deaf students between the ages of 4 and 18 years from various sites across the United States. The participants were grouped by parental hearing status: 122 DCDP were exposed to ASL by at least one deaf adult from birth and were thus considered to be native signers and 442 DCHP who were first exposed to ASL-using deaf adults upon entering the education system. It is important to note that, although the DCDP group is small in comparison to the DCHP group, it represents 22% of the sample, whereas in the population at large, only 5-10% of deaf children are born to deaf parents. Participants were further divided into age groups combining 2 years together in order to have at least 10 DCDP in each of the age groups. The antonyms task used in this study is a video-based, receptive multiple-choice subtest of the ASL Assessment Instrument. Here we[1] briefly reviewed the design of the task. The antonym stimuli were initially constructed by four native signers to vary in difficulty level, including easy antonyms and slightly harder ones. A group of 25 native signers scrutinized antonym pairs to ensure they were indeed antonyms and also confirmed[2] the relationship between each prompt and its foils. The 13 antonym pairs included eight pairs of adjective antonyms and five pairs of verb antonyms. Each of the 13 stimulus items consisted of a prompt (1), the target (a), and three other possible response options: a semantic foil (b), a phonological foil (c), and an unrelated foil (d). The semantic foils are semantically related to the prompt. For example, DARK4 (b) is not an antonym of VAGUE (1) but is semantically related to it. The phonological foils differ in 1 to 3 phonological features (hand shape, movement, location, or palm orientation) from the prompt. For example, the

signs ATTRACT and WANT used in the test differed only in hand shape. The choice of which features differed was equally distributed across movement, location, and palm orientation, while hand shape feature differences only played a role in two foils. The task was piloted on 10 deaf adults with deaf parents. The final task questions were selected from those items that achieved 90% correct or better performance. Of the 564 participants, a subgroup of 138 students aged 7-18 (37 DCDP and 101 DCHP) took the Stanford Achievement Test-Reading Comprehension test in addition to the antonym task ...

Text Sample 47: Introduction section of T54 (F5 score = -4.98)

…The aim of this study is to explore potential crosslinguistic infl uence of the prosodic systems of these speakers. To this end, one function of prosody--namely the marking of information structure--will be investigated. The next section introduces the concept of information structure, describes how it is marked prosodically in English, and discusses studies on the prosodic marking of information structure in English as a L2. The subsequent sections present our study, in which we investigate how information structure is marked both in English produced by L1 Malay speakers and in Malay, and the discussion of our results…

As seen in the Text Samples 46-47, the Methods and the Introduction contained few positive lexico-grammatical features loading in this dimension. Their dimension scores were low and negative (-5.11 and -4.98 respectively). The scores implicitly expressed that ownership was less frequently focused on in these two sections than the others.

Variation along Dimension VI (Modified Information focused)

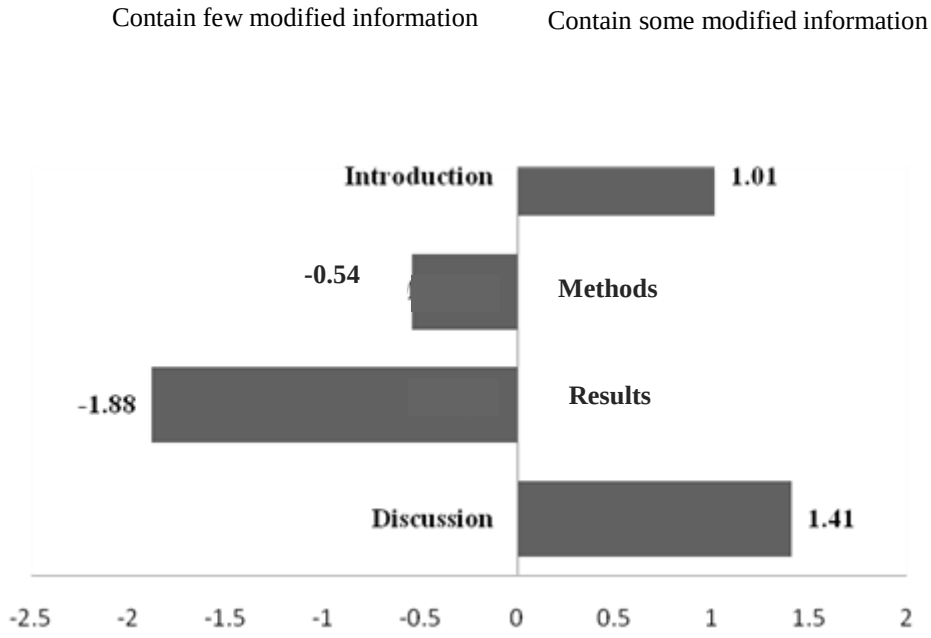

Figure 4.14 The Dimension VI Mean Score of Each Research Article Conventional Section in LTRAC

Note: Introductions ≈ Method, Introduction ≈ Discussions, Methods ≈ Results, and Methods ≈ Discussions

Figure 4.14 shows that for Dimension IV: Modified Information Focused, the research article writers preferred using Gerunds, Present Participial WHIZ Deletion Relatives, Average Word Length, Present Participial Clauses, and Demonstrative Adjectives to modify information. There were statistically significant differences between the Introduction and the Results ($P \leq .05$) as well as the Results and the Discussion ($P \leq .01$).

Observably, no statistically significant differences were found between the Introduction and the Methods, the Introduction and the Discussion, the Methods and the Results, and the Methods and the Discussion ($P > .05$). However, only the Introduction and the Discussion contained positive dimension mean scores (1.41 and 1.01 respectively). It can be presumed that the Introduction and the Discussion contained similar styles of writing. In the Introduction, significance and background

information of the study, the methodological information, and the potential outcomes were provided. In the Discussion, information of the findings in light of what had already been known about the research problem being investigated and new understanding about the problem after the findings had been taken into consideration was described and explained.

Text Samples 48-49 illustrate the use of positive co-occurring lexico-grammatical features such as Gerunds[1], Present Participial WHIZ Deletion Relatives[2], Present Participial Clauses[3], and Demonstrative Adjectives[4].

Text Sample 48: Discussion section of T32 (F6 score = 6.16)

> …This[4] study explored the application of Biber's MDA on a micro-level using[2] a corpus of L2 texts from similarly- structured prompts written across three time periods. The four functional dimensions extracted from the corpus are: (1) Involved vs. Informational Focus, (2) Addressee-Focused Description vs. Personal Narrative, (3) Simplified vs. Elaborated Description, and (4) Personal Opinion vs. Impersonal Evaluation/Assessment. These dimensions present various ways learners structured their responses to essay prompts focusing[3] on the description of people, places, events, or situations. We found that the application of qualitative analysis in examining[1] linguistic co-occurrence patterns in L2 writing[1] can contribute interesting results that can be further analyzed in future research. Similarly, the statistically co-occurring features from these learner descriptions appeared to be interpretable and were supported by text excerpts. A comparison of average dimension scores from sub-registers such as time of writing[1], vocabulary, language use, and total assessment scores of the essays suggested that linguistic co-occurrence data could be used to further characterize L2 student writing[1]. Results also showed that these patterns could be used to illustrate the structural differences in high and low-rated essays or essays written at the beginning[1] or end of a 15-week semester. The specific prompts used in the collection of the corpus may have influenced linguistic patterning in student essays; these[4] prompts directed students to describe topics that are fairly similar in contexts and focused on familiar situations. As we previously noted in this[4] paper, in future related research,

these prompts could be further analyzed to explore the influence of topic on linguistic features in micro MDA studies…

Text Sample 49: Introduction section of T56 (F6 score = 7.77)

…Spelling[1] is important to both writing and reading. Misspelled words can make text more difficult to read, and can cause readers to devalue the quality of a writer's message. In a recent metaanalysis, Graham, Harris, and Hebert found that papers with misspelled words were scored by teachers more harshly for quality of ideas than the same papers with no spelling errors. When 3-13 % of words in a paper were misspelled, scores for the quality of the content of a paper dropped by 0.38 of a standard deviation when compared to the same version of the paper with no spelling errors. Spelling[1] also exerts a toll on the writer, especially developing writers. According to Berninger, difficulty spelling[1] words can interfere with other composing processes. For example, consciously thinking about how to spell a word while writing may tax children's working memory, leading[1] them to forget ideas they have not yet committed to paper. The more often this occurs, the greater the impact on the written product. Uncertainty about how to spell words can further influence the words students choose to use, as they are less likely to use words they cannot spell. The impact of spelling[1] extends beyond the immediate experience of creating or reading text. McCutchen and others contend that transcriptions skills, such as spelling, shape how children go about the process of writing, as these skills are so cognitively demanding that children minimize the use of other composing processes, such as planning[1] and revising[1] while writing[1]. The resulting approach to writing[1], which extends well beyond the primary grades, mostly involves telling what one knows, with little attention directed to the needs of the reader, rhetorical goals, or the organization of text. For children who have considerable difficulty learning[1] to spell, the consequences may be even more pronounced, as they may avoid writing, when possible, and develop a mindset that they cannot write, leading to arrested writing development. In contrast to these potentially negative effects, theorist have long contended that

learning about spelling can enhance reading development by shaping[1] children's knowledge of phonemic awareness, strengthening[1] their grasp of the alphabetic principle, and making sight words easier to remember. A recent meta-analysis by Graham and Hebert provided support for this[4] supposition by showing that spelling instruction enhanced children's word reading skills. Because spelling is so important to children's literacy development, it is essential that they master this[4] skill. This[4] mastery should help minimize spelling's constraints on students' writing, as well as facilitate their acquisition of foundational reading skills. Spelling is a complex skill to master, however. English, for example, does not have a fully predictable and transparent orthography (many sounds in words can be represented by more than one letter or letters). While English orthography is generally systematic, the tactical and procedural rules capturing[2] this[4] regularity range from simple to complex, vary in the number of words they can be applied to, and do not capture all correct spellings...

Text Samples 48-49 were taken from the Discussion and the Introduction. They contained positive dimension scores (6.16 and 7.77 respectively) implying that modified information was frequently found in these two sections. This might be because research article writers frequently described information, namely the patterns, principles, and relationships shown by major findings and place them in proper perspective in the Discussion. Also, some important information such as importance of the research topic, an overview on current research on the subject, the key characteristics of the studies are provided in the Introduction (Annesley, 2010; Hess, 2004; Kretchmer, 2008; Redman, 2011; Samraj, 2002, Sauaia, 2013; Schafer; 2009; Swales, 2004; Swales & Feak, 2004).

Text Sample 50: Methods section of T48 (F6 score = -3.75)

…Negotiating[1] is one of six main meeting purposes identified in the CANBEC corpus. Although none of the participants used the word 'negotiation' to categorise any of the encounters, a number of meetings or parts of meetings involve discourse that fits the definition above of a negotiation. This includes

informal negotiating sequences, for example in internal peer meetings, as well as more formal, staged negotiations, usually in inter-organisational or 'external' meetings. For this[4] study, four external meetings which contained substantial negotiation activity were chosen for an analysis. A mixed-method approach was adopted, drawing[3] on quantitative corpus findings and combining[3] an analysis of global negotiation structures with a micro-analysis of individual sequences. Ethnographic information gathered in compiling[1] CANBEC was also drawn on in interpreting[1] the results…

Text Sample 51: Results section of T47 (F6 score = -10.54)

…The results section begins with evidence of test takers co-constructing meaning by connecting their talk to that of others. The example is also used to demonstrate the way the data were coded. The section then provides summary data of the discourse from each group based on the coding scheme. The discourse of each group followed a similar pattern, one that could be identified as one of mutual contingency. The following is an example of a topic, 'reasons for increased labor standards,' which was successfully established by Group Two. In this[4] sequence, Tatsuki nominates the topic of 'reasons for increased labor standards.' Step one of the modified Keenen and Schieffelin framework appears to be satisfied since Tatsuki looks at both hearers when he speaks, and step two appears to be met since the analyst was able to decipher what the speaker said. Tatsuki completes steps three and four of topic nomination by introducing his opinion that labor standards will improve as a result of consumer pressure. In the following sequence, which begins 15 lines later, there is evidence that Phil accepts the topic. In this[4] sequence, Phil completes the four steps of a hearer for the topic of 'reasons for increased labor standards.' Step one appears to be completed since Phil is looking at Tatsuki both when Tatsuki speaks and when he himself speaks, and step two appears to be satisfied since Phil looks as if he is able to hear what Tatsuki said and is facing him. Phil completes steps three and four of topic establishment when he indicates that he thinks labor standards introduced by foreigners may appear

favorable but are not created with sensible economic constraints. That is, Phil identifies what is important and identifies the semantic relations between referents in the discourse topic. The nominated topic of 'reasons for increased labor standards' is established when Yasuhiro accepts it in the sequence below, 23 lines later. Yasuhiro completes steps one and two in the framework by looking at both Phil and Tatsuki and appearing to hear them. Yasuhiro completes steps three and four of topic establishment when he confirms Phil's view on the topic in line 110, and partially agrees with Tatsuki's view on the topic in lines 128-131…

In Text Samples 50-51 from the Methods and the Results, the dimension scores were low and negative (-3.75 and -10.54 respectively). The scores implied that 'modified information' was less frequently focused on in these two sections.

4.1.4 Interdisciplinary Differences

To answer Research Question 4, "What are inter-disciplinary differences in the co-occurring patterns of lexico-grammatical features between NURAC and LTRAC?", a comparative analysis was employed. This section explains the differences and similarities of co-occurring patterns of lexico-grammatical features found in NURAC and LTRAC.

Results indicated that the four co-occurring patterns of lexico-grammatical features were revealed in NURAC and the six patterns were revealed in LTRAC. There were both similarities and differences of the co-occurring patterns of lexico-grammatical features in these two corpora. Some patterns were similarly labeled because of the salient lexico-grammatical features loading in the dimensions.

Interestingly, three out of the four dimensions in NURAC were also found in LTRAC. That was, the 'Evaluative Stance Focused', 'Established Knowledge Focused', and 'Claim Focused' were patterns found in both corpora. However, the 'Intention Focused' was only found in NURAC and the 'Persuasion Focused', 'Ownership Focused' and 'Modified Information Focused' were only found in LTRAC. Table 4.13 compares similarities and differences of dimensions and their co-occurring salient lexico-grammatical features in NURAC and LTRAC.

Table 4.13 A Comparison of Similarities and Differences of Dimensions and Their Co-occurring Salient Lexico-grammatical Features in NURAC and LTRAC

	Dimension I: Evaluative Stance Focused	Dimension II: Established Knowledge Focused	Dimension III: Claim Focused	Dimension IV: Intention Focused
NURAC	Predicative Adjectives Be as Main Verbs Adverbs Analytic Negations Emphatics (That Verb Complements) Prepositional Phrases Public Verbs Adverbial Subordinators (Present Tense)	Present Tense Average Word Length Attributive Adjectives Present Perfect Aspects Demonstrative Adjectives Nominalizations Split Auxiliaries Phrasal Coordinations	Possibility Modal First Person Pronouns Conjuncts Pronoun It That Verb Complements That Relative Clauses on Subject Position Sentence Relatives That Deletion Causative Adverbial Subordinators Demonstrative Pronouns Private Verbs Predictive Modals Pire-piping Relative Clauses	Infinitives Time Adverbials Suasive Verbs Third Person Pronouns Gerunds Wh Relative Clauses on Subject Positions

Table 4.13 (Continued)

	Dimension I: Persuasion Focused	Dimension II: Evaluative Stance Focused	Dimension III: Claim Focused	Dimension IV: Established Knowledge versus Past Action Focused	Dimension V: Ownership Focused	Dimension VI: Modified Information Focused
LTRAC	Present Perfect Aspects Split Auxiliaries Type Token Ratio Possibility Modal Adverbs Infinitives That Relative Clauses on Subject Position	Predicative Adjectives Be as Main Verbs Analytic Negations Downtoners Emphatics Demonstrative Pronouns Predictive Modals	Suasive Verbs Pronoun It That Verb Complements Private Verbs Wh Relative Clauses on Subject Positions That Deletion Adverbial Subordinators	Present Tense Conjuncts Attributive Adjectives Phrasal Coordinations ---------- Past Participial WHIZ Deletion Relatives Past Tense Agentless Passives	First Person Pronouns Public Verbs Third Person Pronouns Causative Adverbial Subordinators	Gerunds Present Participial WHIZ Deletion Relatives Average Word Length Present Participial Clauses Demonstrative Adjective

Table 4.13 shows that the ‘Evaluative Stance Focused’ was a dimension found in both NURAC and LTRAC. Predicative Adjectives, ‘Be’ as Main Verbs, Analytic Negations, Emphatics, and Adverbs were the five salient features that similarly occurred in the ‘Evaluative Stance Focused’ of both corpora. However, Prepositional Phrases, Public Verbs, and Adverbial Subordinators were specifically found on this dimension of NURAC while Downtoners, Demonstrative Pronouns, and Predictive Modals were found on this similarly labeled dimension in LTRAC. Figure 4.15 indicates the similarities and differences of lexico-grammatical features found in ‘Evaluative Stance Focused’ in NURAC and LTRAC.

‘Evaluative Stance Focused’ in NURAC	**‘Evaluative Stance Focused’ in LTRAC**
Prepositional Phrases Public Verbs Adverbial Subordinators	Downtoners Demonstrative Pronouns Predicative Modals
Predicative Adjectives Be as Main Verbs Analytic Negations Emphatics Adverbs	

Figure 4.15 ‘Evaluative Stance Focused’ of NURAC and LTRAC and Its Salient Lexico-grammatical Features

The ‘Established Knowledge Focused’ was another dimension found in the two corpora. Present Tense, Attributive Adjectives, and Phrasal Coordinations were the three salient features similarly co-occurring in this dimension of both corpora. However, Present Perfect Aspects, Demonstrative adjectives, Nominalizations, Split Auxiliaries, and Phrasal Coordination were specifically found in this dimension of NURAC and Conjuncts and That Verb Complements were specifically found in this

dimension of LTRAC. Figure 4.16 maps out the similar and different salient features loading on ‘Established Knowledge Focused’.

‘Established Knowledge Focused’ in NURAC	**‘Established Knowledge Focused’ in LTRAC**
Present Perfect Aspects Demonstrative Adjectives Nominalizations Split Auxiliaries	Conjuncts That Verb Complements
Present Tense Attributive Adjectives Phrasal Coordination	

Figure 4.16 ‘Established Knowledge Focused’ of NURAC and LTRAC and Its Salient Lexico-grammatical Features

‘Claim Focused’ was the other dimension found in both corpora. The Pronoun It, That Verb Complements, That-deletions, and Private Verbs were the four salient features co-occurring in this dimension of the two corpora. However, in NURAC, the dimension further comprised Possibility Modals, 1st Person Pronouns, Conjuncts, That Relative Clauses on Subject Position, Sentence Relatives, Causative Adverbial Coordinators, Demonstrative Pronouns, Private Verbs, Predictive Modals, and Pire-piping Relative Clauses. In LTRAC, the dimension further contained Suasive verbs, Wh Relative Clauses on Subject Positions, and Adverbial Subordinators. Figure 4.17 presents the similarities and differences of salient lexico-grammatical features found in ‘Claim Focused’

'Claim Focused' in NURAC	**'Claim Focused' in LTRAC**
That Relative Clauses on Subject Position Sentence Relatives Predictive Modals Causative Adverbial Coordinators Possibility Modals 1st Person Pronouns Conjuncts Demonstrative Pronouns Pire-piping Relative Clauses	Wh Relative Clauses on Subject Positions Adverbial Subordinators Suasive Verbs
Pronoun It That Verb Complements That-deletion Private Verbs	

Figure 4.17 'Claim Focused' of NURAC and LTRAC and Its Salient Lexico-grammatical Features

Apart from those similarities, there were some discrepancies of the dimensions found between the two corpora. 'Intention Focused' was found only in NURAC. It contained Infinitives, Time Adverbials, Suasive Verbs, 3rd Person Pronouns, Gerunds, and Wh Relative Clauses on Subject Position.

'Persuasion Focused' was only found in LTRAC. It consisted of Present Perfect Aspects, Split Auxiliaries, Type Toke Ratio, Possibility Modals, Adverbs, Infinitives, and That Relative Clause on Subject Positions.

'Past Action Focused' on the negative end of Dimension V of LTRAC was created by Past Participial Whiz Deletion Relatives, Past Tense, and Agentless Passive.

'Ownership Focused' was only found in LTRAC. It consisted of 1st Person Pronouns, Public Verbs, 3rd Person Pronouns, Causative Adverbial Subordinators, and That Deletions.

Modified Information Focused' was only found in LTRAC. It was formed by Gerunds, Present Participial Whiz Deletion Relatives, Average Word Length, Present Participial Clauses, and Demonstrative Adjectives

This investigation pointed out that lexico-grammatical feature co-occurred together to provide some shared communicative functions for writing research articles. At ease of understanding, the forty-eight lexico-grammatical features are presented in Table 4.14 to recapitulate the dimension(s) that the lexico-grammatical features loaded in.

Table 4.14 A Summary of Lexico-grammatical Features loading on the Dimensions in NURAC and LTRAC

Dimension(s) in NURAC	Lexico-grammatical Feature	Dimension(s) in LTRAC
Evaluative Stance Focused	**Predicative Adjectives**	Evaluative Stance Focused
Evaluative Stance Focused	**Be as main verbs**	Evaluative Stance Focused
Evaluative Stance Focused	**Adverbs**	Evaluative Stance Focused Persuasion Focused
Evaluative Stance Focused	**Analytic Negations**	Evaluative Stance Focused
Evaluative Stance Focused	**Emphatics**	Evaluative Stance Focused
Evaluative Stance Focused	**Prepositional Phrases**	-
Evaluative Stance Focused	**Public Verbs**	Ownership Focused
Evaluative Stance Focused	**Adverbial Subordinators**	Claim Focused
Evaluative Stance Focused Established Knowledge Focused	**Present Tense**	Established Knowledge versus Past Action Focused
Established Knowledge Focused	**Average Word Length**	Modified Information Focused
Established Knowledge Focused	**Attributive Adjectives**	Established Knowledge versus Past Action Focused
Established Knowledge Focused	**Present Perfect Aspects**	Persuasion Focused
Established Knowledge Focused	**Demonstrative Adjectives**	Modified Information Focused
Established Knowledge Focused	**Nominalizations**	-

Table 4.14 (Continued)

Dimension(s) in NURAC	Lexico-grammatical Feature	Dimension(s) in LTRAC
Established Knowledge Focused	**Split Auxiliaries**	Persuasion Focused
Established Knowledge Focused	**Phrasal Coordinations**	Established Knowledge versus Past Action Focused
Claim Focused	**Possibility Modals**	Persuasion Focused
Claim Focused	**First Person Pronouns**	Ownership Focused
Claim Focused	**Conjuncts**	Established Knowledge versus Past Action Focused
Claim Focused	**Pronoun It**	Claim Focused
Evaluative Stance Focused	**That Verb Complements**	Claim Focused
Claim Focused		Established Knowledge versus Past Action Focused
Claim Focused	**That Relative Clauses on Subject Position**	Persuasion Focused
Claim Focused	**Sentence Relatives**	-
Claim Focused	**That Deletion**	Claim Focused Ownership Focused
Claim Focused	**Causative Adverbial Subordinators**	Ownership Focused
Claim Focused	**Demonstrative Pronouns**	Evaluative Stance Focused
Claim Focused	**Private Verbs**	Claim Focused
Claim Focused	**Predictive Modals**	Evaluative Stance Focused
Claim Focused	**Pire-piping Relative Clauses**	-
Intention Focused	**Infinitives**	Persuasion Focused
Intention Focused	**Time Adverbials**	-
Intention Focused	**Suasive Verbs**	Claim Focused
Intention Focused	**Third Person Pronouns**	Ownership Focused
Intention Focused	**Gerunds**	Modified Information Focused
Intention Focused	**Wh Relative Clauses on Subject Position**	Claim Focused
-	**Type Token Ratio**	Persuasion Focused
-	**Downtoners**	Evaluative Stance Focused
-	**Past Participial WHIZ Deletion Relatives**	Established Knowledge versus Past Action Focused

Table 4.14 (Continued)

Dimension(s) in NURAC	Lexico-grammatical Feature	Dimension(s) in LTRAC
-	**Past tense**	Established Knowledge versus Past Action Focused
-	**Agentless Passives**	Established Knowledge versus Past Action Focused
-	**Present Participial WHIZ Deletion Relatives**	Modified Information Focused
-	**Present Participial Clauses**	Modified Information Focused

4.2 Summary

The results of the multidimensional analyses investigating co-occurring patterns of lexico-grammatical features in the 30 nursing research articles in NURAC and the 30 language teaching articles in LTRAC were that the nursing research article writers tended to apply four co-occurring patterns of lexico-grammatical features while the language teaching research article writers tended to use six patterns to write their articles.

In NURAC, Dimension I consisted of ten positive lexico-grammatical features (Predicative Adjectives, Be as Main Verbs, Adverbs, Analytic Negations, Emphatics, That verb Complements, Prepositional Phrases, Public Verbs, Adverbial Subordinators, and Present Tense). Dimension II consisted of eight positive features (Present Tense, Average Word Length, Attributive Adjectives, Present Perfect Aspects, Demonstrative Adjectives, Nominalizations, Split Auxiliaries, and Phrasal Coordinations). Dimension III consisted of thirteen positive features (Possibility Modal, First Person Pronouns, Conjuncts, the Pronoun It, That Verb Complements, That Relative Clauses on Subject Position, Sentence Relatives, That Deletion, Causative Adverbial Subordinators, Demonstrative Adjectives, Private Verbs, Predictive Modals, and Pire-piping Relative Clauses). Dimension IV consisted of six positive features (Infinitives, Time Adverbials, Suasive Verbs, Third Person Pronouns, Gerunds, and Wh Relative Clauses on Subject Positions).

In LTRAC, Dimension I consisted of seven positive features (Present Perfect Aspects, Split Auxiliaries, Type Token Ratio, Possibility Modal, Total Adverbs, Infinitives, and That Relative Clauses on Subject Position). Dimension II consisted of eight positive features (Predicative Adjectives, Be as Main Verbs, Analytic Negations, Downtoners, Emphatics, Demonstrative Pronouns, Predictive Modals, and Adverbs). Dimension III consisted of seven positive features (Suasive Verbs, the Pronoun It, That Verb Complements, Private Verbs, Wh Relative Clauses on Subject Positions, That Deletion, and Adverbial Subordinators). Dimension IV consisted of five positive features (Present Tense, Conjuncts, That Verb Complements, Attributive Adjectives, and Phrasal Coordinations) and three negative features (Past Participial WHIZ Deletion Relatives, Past Tense, and Agentless Passives). Dimension V consisted of six positive features (First Person Pronouns, Public Verbs, Third Person Pronouns, Causative Adverbial Subordinators, and That Deletion). Dimension VI consisted of five positive features (Gerunds, Present Participial WHIZ Deletion, Relatives, Average Word Length, Present Participial Clauses, and Demonstrative Adjectives).

Results also indicated that the four patterns in NURAC provided different functions. In NURAC, the salient features in Dimension I co-occurred to provide an 'Evaluative Stance Focused' function. The salient features in Dimension II composed of an 'Established Knowledge Focused' function. The salient features in Dimension III co-occurred to function as 'Claim Focused'. The salient features loading in Dimension IV co-occurred to provide an 'Intention Focused' function.

In LTRAC, the salient features in Dimension I co-occurred to function as 'Persuasion Focused'. The salient features in Dimension II functioned as 'Evaluative Stance Focused'. The salient features in Dimension III together provided a 'Claim Focused' function. The salient positive and negative features in Dimension IV co-occurred to function as 'Established Knowledge versus Past Action Focused'. The salient features in Dimension V occurred together to function as 'Ownership Focused'. The salient features in Dimension VI provided a 'Modified Information Focused' function.

Findings of intersectional comparison within a corpus also indicated that the use of the four patterns in NURAC overlapped across the research article

conventional sections. In addition, similarities and differences across sections of the nursing research articles were also revealed. ‘Evaluative Stance Focused’ was the focus of the Introduction, the Results, and the Discussion. ‘Established Knowledge Focused’ was the focus of the Introduction. ‘Claim Focused’ was the focus of the Discussion. ‘Intention Focused’ was the focus of the Introduction, the Methods and the Discussion.

In LTRAC, ‘Persuasion Focused’ was the focus of both the Introduction and the Discussion. ‘Evaluative Stance Focused’ focused on both the Results and the Discussion. ‘Claim Focused’ focused on both the Introduction and the Discussion. ‘Established Knowledge Focused’ focused on the Introduction and the Discussion while ‘Past Action Focused’ focused on both the Methods. ‘Ownership Focused’ emphasized the Result and the Discussion. ‘Modified Information Focused’ was the focus of both the Introduction and the Discussion.

Moreover, results of interdisciplinary comparison indicated that three out of the four dimensions in NURAC were also found in LTRAC. That was, the ‘Evaluative Stance Focused’, ‘Established Knowledge Focused’, and ‘Claim Focused’ were the patterns found in both corpora. However, the ‘Intention Focused’ was only found in NURAC and the ‘Persuasion Focused’, ‘Past Action Focused’, ‘Ownership Focused’ and ‘Modified Information Focused’ were only found in LTRAC.

This chapter presented and discussed the results of the multidimensional analyses of the NUTRAC and LTRAC. First, the four dimensions in NURAC and the six dimensions in LTRAC, isolated with their co-occurring lexico-grammatical features, were interpreted and labeled in terms of their basic communicative functions shared by the lexico-grammatical features. Then, the chapter reported the similarities and differences among the research article conventional sections as indexed respectively by each of the four functional dimensions in NURAC and six functional dimensions in LTRAC. Results showed that the conventional section might be similar or different in terms of the extent to which they are marked by the dimensions. In the next chapter, the results were discussed in light of previous literatures and in summary of this study, some limitations, and some recommendations were also provided.

CHAPTER 5

SUMMARY, DISCUSSION, LIMITATIONS, AND IMPLICATIONS

This chapter consists of five main sections. Section 5.1 provides a summary of the study. Section 5.2 discusses the results of this study. Section 5.3 explains the limitations of this study. Section 5.4 contributes pedagogical implications and implications for further research. Section 5.5 is a conclusion of this research study.

5.1 Summary

This study employed Biber's (1995) multidimensional analysis technique to investigate co-occurring patterns of sixty-seven lexico-grammatical features in the corpora of the thirty nursing research articles and the thirty language teaching research articles. However, the results of frequency counts indicated that some features were scarcely used in the two corpora. Thus, the researcher reduced the original set of lexico-grammatical features to forty-eight, still representing the original sixty-seven lexico-grammatical features. This study differed from Biber's (1995, 2004) and his followers' (e.g. Biber et al., 2002; Biber et al., 2006; Daems, Speelman, & Ruette, 2013; Connor & Upton, 2013; Friginal, 2009; Gozdz-Roszkowski, 2011; Guinovart, 2000; Louwerse, McCarthy, McNamara, & Graesser, 2004) in that their studies investigated English spoken and written discourses from various situations while this study investigated co-occurring patterns of lexico-grammatical in the research articles from two polarized disciplines. The function of each dimension (or co-occurring pattern) was interpreted based on a shared communicative function of its lexico-grammatical features co-loading in. The dimensions of this study were inclined to represent communicative functions that are less broad yet more restricted than

Biber's and his followers'. The four dimensions found in the thirty nursing research articles were Dimension I: Evaluative Stance Focused, Dimension II: Established Knowledge Focused, Dimension III: Claim Focused, and Dimension IV: Intention Focused. The six dimensions revealed in the thirty language teaching research articles included Dimension I: Persuasion Focused, Dimension II: Evaluative Stance Focused, Dimension III: Claim Focused, Dimension IV: Established Knowledge versus Past Action Focused, Dimension V: Ownership Focused, and Dimension VI: Modified Information Focused. These specific patterns of linguistic variation resulted in dimensions of variations unique to the research discourse domain. Further analysis, with the application of ANOVA and post hoc tests, showed that similarities and differences occurred across the research article conventional sections in each corpus. Moreover, an interdisciplinary comparative analysis indicated that there were some similarities and discrepancies of the lexico-grammatical co-occurring patterns between the two corpora.

5.2 Discussion

The previous chapter explored the co-occurring patterns of lexico-grammatical features, interpreted their functional dimensions in association with nursing and language teaching research articles, and compared their similarities and differences within- and across-disciplines. Hence, this section discusses the findings regarding the four research questions.

5.2.1 The Co-occurring Patterns of Lexico-grammatical Features and Their Communicative Functions in Nursing Research Article Corpus (NURAC) and Language Teaching Research Article Corpus (LTRAC)

The results of the multidimensional analysis showed that the NURAC contained four dimensions and the LTRAC comprised six dimensions. However, unlike other dimensions, Dimension IV of LTRAC consisted of two complementary ends – negative and positive. Each dimension served as a parameter measuring how much each research article conventional section made use of the co-occurring lexico-

grammatical features. Measuring each research article conventional section on all of the four dimensions in NURAC and the six in LTRAC resulted in rich and accurate descriptions of the conventional sections of nursing and language teaching research articles.

Compared to scholars (e.g. Baoya, 2010; Biber, 1995; Getkham, 2010; Kanoksilpatham, 2003), some labels assigned to the dimensions found in both corpora were similar while others differed.

The four dimensions revealed in NURAC were respectively labeled ‘Evaluative Stance Focused’, ‘Established Knowledge Focused’, ‘Claim Focused’, and ‘Intention Focused’. The six dimensions revealed in LTRAC were respectively named ‘Persuasion Focused’, ‘Evaluative Stance Focused’, ‘Claim Focused’, ‘Established Knowledge versus Past Action Focused’, ‘Ownership Focused’, and ‘Intention Focused’.

Results indicated that ‘Evaluative Stance Focused’ in Dimension I of NURAC and Dimension II of LTRAC contained five similar salient lexico-grammatical features (Predicative Adjectives, Be as Main Verbs, Emphatics, Analytic Negations, and Adverbs). Surprisingly, the findings are as those of several researchers (e.g. Auria, 2008; Baoya, 2015; Biber, 1995; Charles, 2006; Getkham, 2010; Hunston & Thompson, 2001; Kanoksilpatham, 2003; Soler, 2002; Tutin, 2009) in that Be as Main Verbs tend to co-occur with Predicative Adjectives, Emphatics, and Adverbs to express evaluative stance. Though, this dimension was labeled ‘Evaluative Stance Focused’, Baoya (2015) named this dimension in his corpus ‘Evaluative Stances’ while Biber (1995), Getkham (2010), and Kanoksilpatham (2003) differently labeled it ‘Evaluative Stance’.

In addition, ‘Established Knowledge Focused’ in Dimension II of NURAC and Dimension IV of LTRAC contained three similar salient lexico-grammatical features (Present Tense co-occurred with Phrasal Coordinations and Attributive Adjectives). This is also in congruence with those of several researchers (e.g. Baoya, 2015; Charak & Norouzi, 2013; Getkham, 2010; Hartwell & Jacques, 2014; Kanoksilpatham, 2003; Li & Ge, 2009; Matthews & Matthews, 2007; Swales, 2004; Tod-Trimble & Trimble, 1982) in that Present Tense tends to co-occur with Attributive Adjectives and Phrasal Coordinations to provide readers with some

established knowledge in the field. Although this dimension was labeled ‘Established Knowledge Focused’, Baoya (2015) named it ‘Current Information’, Getkham (2010) named it ‘Expression of Generality’, whereas Kanoksilpatham (2003) named it ‘Attribute Knowledge’,

Moreover, ‘Claim Focused’ in Dimension III of NURAC and Dimension III of LTRAC contained four similar salient lexico-grammatical features (Pronoun It, That Verb Complements, That Deletions, and Private Verbs). The findings are in congruence with those of several researchers (e.g. Biber et al., 1999; Getkham, 2010; Hewings & Hewings, 2002; Hunston & Sinclair, 2000; Kanoksilpatham, 2003; Martin, Matthiesssen, & Painter, 1997; Rodman, 1994; Thompson, 1994) in that research article writers applied Pronoun It with That Verb Complements, That Deletions, and Private Verbs to claim the importance of the findings. Although this dimension was labeled ‘Claim Focused’, Getkham (2010) and Kanoksilpatham (2003) named this kind of discourse in their corpora ‘Framing Claims’.

‘Intention Focused’ in Dimension IV of NURAC was about manifesting the writers’ intentions. The findings are similar to Getkham’s (2010) and Kanoksilpatham’s (2003) studies in that when Infinitives significantly load the highest in a dimension, the dimension implicitly expresses writers’ intents. Though this dimension was labeled ‘Intention Focused’, Getkham (2010) and Kanoksilpatham (2003) named this type of discourse ‘Expression of Purposes’.

‘Persuasion Focused’ in Dimension I of LTRAC was restricted to providing the writers’ persuasions. The findings are in accordance with Biber’s (1995) and O’Connor’s (2009) studies in that Split Auxiliaries, Possibility Modals and Infinitives co-occur to perform persuasive expressions. Although this dimension was labeled ‘Persuasion Focused’**,** Biber (1995) named this dimension as ‘Overt Expression of Persuasion’.

‘Past Action Focused’ on the negative end of Dimension IV of LTRAC was about describing past actions. The results are also in line with those of several researchers (e.g. Baoya, 2015; Bazerman, 1988; Burrough-Boenish, 2003; Charak & Norouzi, 2013; Gledhill, 2000; Halliday, 2013; Hartwell & Jacques, 2014; Getkham, 2010; Kanoksilpatham, 2003; Malcolm, 1987; Martın, 2003; Matthews & Matthews, 2007; Riley, 1991; Salager-Meyer, 1992; Smith & Bernhardt, 1997; Swales, 2004;

Swales & Feak, 2004; Tarone et al., 1981; Taylor, 2001; Tod-Trimble & Trimble, 1982; Wilkinson, 1992) in that when any forms of Passives co-occur with the Past Tense, they implicitly discuss past actions. This dimension was named ‘Past Action Focused’, though Baoya (2010) named it ‘Past Action’,

‘Ownership Focused’ in Dimension V of LTRAC was restricted to presenting the writers’ ownership. The results are unexpectedly similar to those of several other scholars (e.g. Bazerman, 1988; Getkham, 2010; Kanoksilpatham, 2003; Hartwell & Jacques, 2014) in that when Person Pronouns load significantly on a dimension, they implicitly manifest the writers’ ownership. Though this dimension was named ‘Ownership Focused’, Getkham (2010) labeled it ‘Expression of Ownership’.

‘Modified Information Focused’ in Dimension VI of LTRAC was about informational modification. Interestingly, the findings are in line with Baoya’s (2015) in that modifying information can be noticed from the co-occurrence of Present Participial WHIZ Deletion Relatives and Present Participial Clauses. Though this dimension was labeled ‘Modified Information Focused’, Baoya (2015) named it ‘Modified Information’,

When NURAC was compared specifically with Kanoksilpatham’s (2003) corpus, which contained bioengineering research articles, all four dimensions in NURAC were similar to the four out of the seven dimensions in Kanoksilpatham’s (2003) corpus. Kanoksilpatham’s and NURAC similarly contained ‘Evaluative Stance Focused’, ‘Intention Focused’, ‘Claim Focused’, and ‘Established Knowledge Focused’. However, ‘Conceptual versus Specific Reference’, ‘Concrete Action versus Abstract Notion’, and ‘Expression of Contradiction’ were only found in Kanoksilpatham’s corpus. Also, when LTRAC was compared with Baoya’s (2015) and Getkham’s (2010) corpora, which contained educational and applied linguistic research articles, the four out of the six dimensions in LTRAC were likewise found in Baoya’s corpus. Baoya’s and LTRAC both contained ‘Evaluative Stance Focused’, ‘Established Knowledge Focused’, ‘Past Action Focused’, and ‘Modified Information Focused’. However, ‘Logical Probability’, ‘Commentary’, and Unsatisfactory Status Quo’ were only found in Baoya’s corpus. Moreover, the four out of the six dimensions in LTRAC were also found in Getkham’s corpus. Both Getkham’s and LTRAC comprised ‘Established Knowledge Focused’, ‘Evaluative Stance Focused’,

Claim Focused' and 'Ownership Focused'. If combining the comparisons between LTRAC and Baoya's as well as Getkham's corpora, it could be said that most patterns revealed in LTRAC were similar to those found in both Baoya's and Getkham's studies.

The researcher considered that the reason for the similarities and differences of the dimensions between these three scholars (Baoya, 2015; Getkham, 2010; Kanoksilpatham, 2003) could be because all studies similarly investigated research articles within different disciplines, each with its own style of linguistic device uses.

However, what made NURAC slightly diverge from Kanoksilpatham's (2003) corpus and LTRAC slightly discrepant from Baoya's (2015) and Getkham's (2010) corpora was the number of dimensions revealed in the corpora. This could be due to the different sizes of the corpora, including various amounts of lexico-grammatical features investigated (Pallant, 2007; Sapnas & Zeller, 2002).

Results, indicating the four co-occurring patterns of lexico-grammatical features revealed in NURAC and the six patterns found in LTRAC, demonstrated that, in this corpus-based analysis, each lexico-grammatical feature used in research articles has its own communicative function which is quite different from the traditional grammar. Also, when some lexico-grammatical features co-cluster, they together provide at least one shared communicative function for writing research articles. Interestingly, the researcher discovered predicative adjectives always co-occur with verbs to be, emphatics, and analytic negations to present evaluative statements. Present tense always co-loads with attributive adjectives and phrasal coordinations to talk about established knowledge. Private verbs always co-clusters with 'that' verb complement, pronoun 'it', and 'that' deletion to present importance of the studies or findings.

5.2.2 Cross-sectional Differences of the Patterns Used within NURAC and within LTRAC

In NURAC, there were both similarities and differences of the pattern uses among the four conventional sections

In Dimension I: Evaluative Stance Focused, there were no statistically significant differences found between the Introduction and the Results, and between

the Results and the Discussion. The positive lexico-grammatical features loading on this dimension were frequently found in the Discussion, the Results, and the Introduction. This could indicate that these sections contained high evaluative stance as the writers tried to evaluate current and previous studies in these three sections. However, the mean scores of the positive lexico-grammatical features were found less frequently in the Methods, with the writer presenting less evaluative stance in this section. It was not surprising to find that this finding is in line with those of several other scholars (Baoya, 2015, Cargil & O'Connor, 2009; ElMalik & Nesi, 2008; Getkham, 2010; Hirano, 2009; Huth, 1990; Kanoksilpatham, 2003, Li & Ge, 2009; Loi, 2010; Ngowu, 1997; Posteguillo, 1999; Redman, 2011;Samraj, 2002; Sheldon, 2011; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Swales & Feak, 2004; Swales & Najjar, 1987; Tessuto, 2015) in that research article writers refer to and evaluate some established knowledge in the Introduction. They sometimes discuss and evaluate their own findings in the Results, and compared their specific outcomes with other studies and evaluated them in the Discussion. In the Methods, research article writers mainly explain their research methodologies, causing the rare occurrence of evaluative stance.

In Dimension II: Established Knowledge Focused, there were statistically significant differences across all research article conventional sections. The highest mean score belonged to the Introduction suggesting that the writers focused on presenting established knowledge in the section while the lowest mean score reveals that the Results suggested little established knowledge. Presumably, the researchers frequently mentioned established knowledge in the Introduction. This might be because the writers tried to indicate knowledge gaps and prioritize their studies by discussing established knowledge in the section. Interestingly, this is also in line with several other scholars in that established knowledge is often mentioned in the Introduction (Baoya, 2015, Cargil & O'Connor, 2009; ElMalik & Nesi, 2008; Freedman & Plotnick, 2011; Getkham, 2010; Hirano, 2009; Huth, 1990; Kanoksilpatham, 2003, Li & Ge, 2009; Loi, 2010; Ngowu, 1997; Posteguillo, 1999; Redman, 2011; Samraj, 2002; Sheldon, 2011; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Swales & Feak, 2004; Swales & Najjar, 1987; Tessuto, 2015).

In Dimension III: Claim Focused, there were no statistically significant differences found between the Methods and the Results. However, the similarities between the Methods and the Results did not indicate Claim Focused since the low and negative mean scores of both sections suggested that the Methods and the Results were less focused on making claims. It was likely that the research article writers usually reported what they did and gained from their observations rather than providing claims in the Methods and the Results. On the other hand, it was noticeable that the positive highest mean score for the Discussion suggesting claims can be frequently found in the Discussion. Presumably, this might be because the research article writers tried to provide importance claims by discussing the significance of the findings, explained any new understanding about the problem, commented on whether or not the results were expected, and claimed for how the results can be more generally applied in the section. As expected, this is also in line with a number of other scholars in that significance claims are frequently found in the Discussion of research articles (Annesley, 2010; Baoya, 2015, Cargil & O'Connor, 2009; Dudley-Evans, 1998; ElMalik & Nesi, 2008; Getkham, 2010; Hirano, 2009; Hess, 2004; Huth, 1990; Kanoksilpatham, 2003, Kretchmer, 2008; Li & Ge, 2009; Loi, 2010; Ngowu, 1997; Peacock, 2002; Posteguillo, 1999; Redman, 2011;Samraj, 2002; Sauaia, 2013; Schafer, 2009; Sheldon, 2011; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Swales & Feak, 2004; Swales & Najjar, 1987; Tessuto, 2015).

In Dimension IV: Intention Focused, there were no statistically significant differences between the Introduction, the Methods, and the Discussion. That means the Introduction, the Methods, and the Discussion contained similar styles of writing. The research article writers stated the objectives of their studies in the Introduction, explained what procedures they had used to investigate regarding each objective, research question, and hypothesis in the Methods, and discussed the findings by referring back to the purposes, research questions, and hypotheses proposed in the Discussion. Subsequently, the findings are in line with scholars in that research article writers frequently express their intention (what to be investigated) in the objectives and hypotheses parts of the Introduction, explain how they intend to analyze the results in the Methods, and provide suggestion for further research in the Discussion (Annesley, 2010; Azevedo et al., 2011; Baoya, 2015; Bruce, 2008; Butin, 2010; Brett,

1994; Burton, 2008; Cargil & O'Connor, 2009; Carter, 2012; Dudley-Evans, 1998; ElMalik & Nesi, 2008; Getkham, 2010; Gunawardena, 1989; Hess, 2004; Hirano, 2009; Huth, 1990; Kallet, 2004; Kanoksilpatham, 2003, Kretchmer, 2003; Li & Ge, 2009; Lim, 2006; Loi, 2010; Lunenburg, 2008; Ngowu, 1997; Peacock, 2002; Posteguillo, 1999; Redman, 2011; Samraj, 2002; Sheldon, 2011; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Sauaia, 2013; Schafer, 2009; Swales & Feak, 2004; Swales & Najjar, 1987; Tessuto, 2015; Trimble & Trimble, 1982; William, 1999)

In LTRAC, there were also both similarities and differences of the pattern uses among the four conventional sections

In Dimension I: Persuasion Focused, there were no statistically significant differences found between the Introduction and the Discussion. That means the Introduction and the Discussion sections contained similar styles of writing. Presumably, this could be because the research article writers used evidences and reasons to convince readers to agree with their points of view on a particular topic. Interestingly, this is in accordance with many scholars in that research article writers frequently presented their persuasions in the Introduction and the Discussion (Annesley, 2010; Baoya, 2015; Cargil & O'Connor, 2009; Carter, 2012; Dudley-Evans, 1998; Elina, 2011; ElMalik & Nesi, 2008; Freedman & Plotnick, 2011; Getkham, 2010; Hess, 2004; Hirano, 2009; Huth, 1990; Kanoksilpatham, 2003, Kretchmer, 2003; Li & Ge, 2009; Loi, 2010; Ngowu, 1997; Peacock, 2002; Posteguillo, 1999; Redman, 2011; Samraj, 2002; Sheldon, 2011; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Sauaia, 2013; Schafer, 2009; Swales & Feak, 2004; Swales & Najjar, 1987; Tessuto, 2015).

In Dimension II: Evaluative Stance Focused, there were no statistically significant differences between the Introduction and the Methods, between the Introduction and the Results, and between the Results and the Discussion. The positive mean scores in the Results and the Discussion suggested that the research article writers focused on expressing evaluative stances in these two sections while the lowest mean score in the Methods suggested a lack of evaluative stances. Presumably, the research article writers frequently expressed evaluative stances in the Results and the Discussion of LTRAC. Expectedly, this is congruent with other scholars, as the writers frequently evaluate current and previous studies in these two

sections (Annesley, 2010; Baoya, 2015: Cargil & O'Connor, 2009; Dudley-Evans, 1998; ElMalik & Nesi, 2008; Freedman & Plotnick, 2011; Getkham, 2010; Hess, 2004; Kanoksilpatham, 2003, Kretchmer, 2003; Li & Ge, 2009; Ngowu, 1997; Peacock, 2002; Posteguillo, 1999; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Sauaia, 2013; Schafer, 2009; Tessuto, 2015).

In Dimension III: Claim Focused, there were no statistically significant differences found between the Introduction and the Methods, between the Introduction and the Results, between the Introduction and the Discussion, between the Methods and the Results, and between the Results and the Discussion. However, the positive mean scores in the Discussion and the Introduction suggested that the research article writers tended to focus on manifesting claims in these two sections, while the negative mean score in the Methods and the Results implied few claims. Presumably, the research article writers made claims in the Introduction and the Discussion of the language teaching research articles. The findings are consistent with previous studies in that claims are frequently found in the Introduction and the Discussion of research articles (Annesley, 2010; Baoya, 2015; Cargil & O'Connor, 2009; Carter, 2012; Dudley-Evans, 1998; Elina, 2011; ElMalik & Nesi, 2008; Getkham, 2010; Hess, 2004; Hirano, 2009; Huth, 1990; Kanoksilpatham, 2003, Kretchmer, 2003; Li & Ge, 2009; Loi, 2010; Ngowu, 1997; Peacock, 2002; Posteguillo, 1999; Redman, 2011; Samraj, 2002; Sheldon, 2011; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Sauaia, 2013; Schafer, 2009; Swales & Feak, 2004; Swales & Najjar, 1987; Tessuto, 2015).

In Dimension IV: Established Knowledge versus Past Action Focused, there were no statistically significant differences were found between the Introduction and the Discussion. Understandably, The Introduction and the Discussion contained similar styles of writing, with the research article writers mentioning established knowledge. It was not surprising to know that the findings are in line with Baoya's (2015), Getkham's (2010) and Kanoksilpatham's (2003) studies in that research article writers discuss established knowledge to specify some research gaps that need fulfilling in the Introduction and argue the findings whether they are similar or different with the established knowledge in the Discussion (Annesley, 2010; Baoya, 2015; Cargil & O'Connor, 2009; Carter, 2012; Dudley-Evans, 1998; Elina,

2011; ElMalik & Nesi, 2008; Getkham, 2010; Hess, 2004; Hirano, 2009; Huth, 1990; Kanoksilpatham, 2003, Kretchmer, 2003; Li & Ge, 2009; Loi, 2010; Ngowu, 1997; Peacock, 2002; Posteguillo, 1999; Redman, 2011; Samraj, 2002; Sheldon, 2011; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Sauaia, 2013; Schafer, 2009; Swales & Feak, 2004; Swales & Najjar, 1987; Tessuto, 2015), while research article writers explain the procedures they used in their studies in the Methods (Azevedo et al., 2011; Baoya, 2015; Bruce, 2008; Butin, 2010; Cargil & O'Connor, 2009; Carter, 2012; ElMalik & Nesi, 2008; Getkham, 2010; Gunawardena, 1989; Huth, 1990; Kallet, 2004; Kanoksilpatham, 2003; Li & Ge, 2009; Lim, 2006; Lunenburg, 2008; Ngowu, 1997; Posteguillo, 1999; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Tessuto, 2015; Trimble & Trimble, 1982).

In Dimension V: Ownership Focused, there were no statistically significant differences found among all of the research article conventional sections, assuming that all sections contained quite similar styles of writing. However, the Results and the Discussion contained positive factor scores implying ownership was frequently found in these two sections. This is in congruence to several scholars in that research article writers frequently manifested their ownership in the Results and the Discussion of research articles (Annesley, 2010; Baoya, 2015; Brett, 1994; Bruce, 2009; Burton, 2008; Cargil & O'Connor, 2009; Dudley-Evans, 1998; ElMalik & Nesi, 2008; Getkham, 2010; Hess, 2004; Huth, 1990; Kanoksilpatham, 2003; Krishnan, 2013; Kretchmer, 2003; Li & Ge, 2009; Lim, 2010; Ngowu, 1997; Peacock, 2002; Posteguillo, 1999; Redman, 2011; Samraj, 2002, Schafer, 2009; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Sauaia, 2013; Swales, 2004; Swales & Feak, 2004; Tessuto, 2015; William, 1999).

In Dimension VI: Modified Information Focused, there were no statistically significant differences found among the Introduction and Methods, the Introduction and the Discussion, the Methods and the Results, and the Methods and the Discussion. Nonetheless, only the Introduction and the Discussion contained positive mean factor scores, presuming that the two sections contained similar styles of writing. This is in accordance with numerous scholars (Annesley, 2010; Baoya, 2015: Cargil & O'Connor, 2009; Dudley-Evans, 1998; ElMalik & Nesi, 2008; Getkham, 2010; Hess, 2004; Kanoksilpatham, 2003, Kretchmer, 2003; Li & Ge, 2009; Ngowu, 1997;

Peacock, 2002; Posteguillo, 1999; Redman, 2011; Samraj, 2002, Sauaia, 2013; Schafer, 2009; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Swales, 2004; Swales & Feak, 2004; Tessuto, 2015) in that research article writers frequently provide information about significance of the study, research background, the methodological approach, and the potential outcomes in the Introduction while in the Discussion, they frequently describe the significance of the findings, and explain any new understanding about the problem after they had taken the findings into consideration.

Results, indicating cross-sectional significant differences along the dimensions in both corpora, demonstrated that the research article conventional sections are distinguishable in terms of the degree in which they were marked by a given functional dimension underlying a set of co-occurring lexico-grammatical features. The multidimensional analyses generated valuable results providing a further valid description of nursing and language teaching research articles.

5.2.3 Inter-disciplinary Differences of the Patterns Used between NURAC and LTRAC

Interestingly, there were some slight differences of stylistic elements between these nursing and language teaching disciplines. As seen from Table 4.13 (A Comparison of Similarities and Differences of Dimensions and their Co-occurring Salient Lexico-grammatical Features in NURAC and LTRAC) in Chapter IV, the ‘Evaluative Stance Focused’ contained the highest percentage of variance in NURAC (17.36 %) while the ‘Persuasion Focused’ contained the highest percentage of variance in LTRAC (13.98 %). Presumably, what makes order of the dimensions in NURAC and LTRAC discrepancy is their natures. According to scholars (Barr, 2006; Boutellier, Gassmann, & Raeder, 2011; Bryman, 2008; Galavotti, 2003; Hunt & Colander, 2008; Lagemaat, 2006; Ledoux, 2002), writing in nursing involves theories that are tested in order to solve problems or hypotheses. Therefore, nursing research articles are to evaluate and conclude from the testing. Conversely, writing in the language teaching research articles encompasses the art of taking a stand. Hence, persuading readers is the key characteristic that distinguish the language teaching research articles from nursing research articles. This might be an underlying reason

that the ‘Evaluative Stance Focused’ was the first dimension in NURAC while ‘Persuasion Focused’ was the first dimension in LTRAC.

‘Established knowledge Focused’ was similarly found in the Introduction of both NURAC and LTRAC. ‘Evaluative Stance Focused’ and ‘Intention Focused’ were found in the Introduction of NURAC while ‘Persuasion Focused’, ‘Claim Focused’, and ‘Modified Information Focused’ were found in the Introduction of LTRAC. That ‘Established Knowledge Focused’ was found in the Introduction of NURAC and LTRAC is in keeping with those of several scholars (Cargil & O’Connor, 2009; ElMalik & Nesi, 2008; Getkham, 2010; Hirano, 2009; Huth, 1990; Kanoksilpatham, 2003; Li & Ge, 2009; Loi, 2010; Ngowu, 1997; Posteguillo, 1999; Redman, 2011; Samraj, 2002; Sheldon, 2011; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Swales & Feak, 2004; Swales & Najjar, 1987; Tessuto, 2015) in that most research articles usually summarizes established knowledge about the research topic in the Introduction.

That ‘Intention Focused’ was found in the Introduction of NURAC is pursuant to Kanoksilpatham’s (2003) and Cargil and O’Connor’s (2009) results in that purposes of the study were always mentioned in the Introduction of research articles in the form of infinitive phrases (e.g. to study……, to investigate……, to examine…).

That ‘Evaluative Stance Focused’ was found in the Introduction of NURAC is in accordance with Boutellier, Gassmann, and Raeder (2011) in that research article writers usually acknowledge why they rejected alternative approaches that could have been used to examine the topics.

That ‘Claim Focused’, ‘Persuasion Focused’, and ‘Modified Information Focused’ were identified in the Introduction of LTRAC is pursuant to those of several scholars (Annesley, 2010; Baoya, 2015; Getkham, 2010; Hess, 2004; Kretchmer, 2008; Redman, 2011; Samraj, 2002, Sauaia et al., 2013; Schafer; 2009; Swales, 2004; Swales & Feak, 2004) in that some reviews of the related literature, benefits of the results, and importance of the research topic were usually provided in this section.

That ‘Intention Focused’ was found in the Methods of NURAC , in congruent with those of several researchers (Azevedo et al., 2011; Baoya, 2015; Bruce, 2008; Butin, 2010; Cargil & O’Connor, 2009; Carter , 2012; ElMalik & Nesi, 2008; Getkhm, 2010; Huth, 1990; Gunawardena ,1989; Kallet, 2004; Kanoksilpatham,

2003; Lim, 2006; Lunenburg, 2008; Richard, 2004; Sollaci & Pereira, 2004; Tod-Trimble & Trimble ,1982; Li & Ge, 2009; Ngowu, 1997; Posteguillo,1999; Stoller & Robinson , 2013; Tessuto, 2015; Lunenburg, 2008) in that the article writers usually describe the procedure used to examine each research objective in this section.

That 'Past Action Focused' was found in the Methods of LTRAC was pursuant to Baoya's (2015) research where research article writers usually explained how data was collected and analyzed in this section.

That 'Evaluative Stance Focused' was found in the Results of both corpora is in line with those of several scholars (Baoya, 2015; Brett, 1994; Bruce, 2009; Burton, 2008; Cargil & O'Connor, 2009; ElMalik & Nesi, 2008; Getkham, 2010; Hancock & Bob, 2011; Huth, 1990; Kanoksilpatham, 2003; Kretchmer, 2003; 2009; Krishnan, 2013; Li & Ge, 2009; Lim, 2010; Ngowu, 1997; Posteguillo, 1999; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Tessuto, 2015; William, 1999) in that research article writers usually report and sometimes evaluate their findings of studies based upon the methodology applied in the Results.

That 'Ownership Focused' was found in the results of LTRAC is in congruence with Getkham's (2010) study in that research article authors usually express their ownerships when presenting their own findings.

That 'Evaluative Stance Focused' and 'Claim Focused' were similarly found in the Discussion of both NURAC and LTRAC, is pursuant to those of several researchers (Annesley, 2010; Baoya, 2015; Cargil & O'Connor, 2009; Dudley-Evans,1998; ElMalik & Nesi, 2008; Getkham , 2010; Hess, 2004; Huth, 1990; Kanoksilpatham, 2003; Kretchmer, 2008; Li & Ge, 2009; Ngowu,1997; Peacock, 2002; Posteguillo,1999; Sauaia, 2013; Schafer, 2009; Sollaci & Pereira, 2004; Stoller & Robinson, 2013; Tessuto, 2015) in that research article writers usually discuss and evaluate their results, and claim the importance of their studies by highlighting how their studies may conducive to the contribution to and / or help to fill existing gaps in the field.

That 'Intention Focused' was found in the Discussion of NURAC is in congruence with Kanoksilpatham's (2003) study in that research article writers usually provide some valuable implications to be developed in further studies in this part.

That ‘Persuasion Focused’, ‘Established Knowledge Focused’, ‘Ownership Focused’, and ‘Modified Information Focused’ were found in the Discussion of LTRAC is in accordance to numerous researchers (Annesley, 2010; Bitchener & Basturkmen, 2006; Getkham, 2010; Kretchmer, 2008) in that research article writers discuss and compare their findings with some established knowledge and sometimes state or describe how findings from their studies fulfill gaps in the literature that have not been previously exposed in this section.

As can be seen, some lexico-grammatical patterns used in both NURAC and LTRAC were similar while some were different. Presumably, this might be because the stylistic elements used in all scientific writing are similar but the natures of nursing research articles and language teaching research articles are different. The former usually focuses on informing readers of new discoveries of truth through facts and solid data given in detail while the latter usually seeks to analyze, interpret, argue, and / or explain and express thoughts. This is pursuant to other scholars (Barr, 2006; Boutellier, Gassmann, & Raeder, 2011; Bryman, 2008; Dewey, 2008; Galavotti, 2003; Hunt & Colander, 2008; Jaffe, 2015; Lagemaat, 2006; Ledoux, 2002) in that the nursing research article writers tend to imply that their studies and their finding are important while the language teaching research article writers tend to provide persuasive evidence that a need exists for the studies.

5.3 Limitations

This study was subject to the following limitations:

Selection of the corpora was restricted to only the two specific disciplines: nursing and language teaching. Accordingly, generalizing of the results is restricted to those specific corpora. Moreover, the lexico-grammatical features investigated in this dissertation depended only on the performance of the automated tagger (MAT 1.3) (Nini, 2013). Hence, the result of this research study might not cover all significant lexico-grammatical features that co-occur in these two corpora.

Due to the fact that the majority of the selected articles are quantitative-oriented, generalizability of the results of this study would be in quantitative-oriented articles.

Apart from the advantages provided by the MAT 1.3, some drawbacks could also be seen. Although the software tries to facilitate the researcher by helping plot the input corpus and determine its closest text type, the labels assigned by this software was restricted to the Biber's (1995) dimensions. Therefore, the MAT 1.3 is recommended only for annotating words in the corpus. However, for dimension extractions and functional interpretation, a factor analysis in a statistical software and comparison to previous studies are recommended to create the originality of the study. Another noticeable disadvantage of the MAT 1.3 is that it is not able to tag a 'progressive aspect'. According to Baoya (2015), present, past, and future progressive aspects are all found to be rarely used in research articles. That was why not being to tag progressive aspects did not affect the results of this dissertation.

5.4 Implications

Given the findings of this dissertation, the following pedagogical implications and implications for further research could be applied into the classroom and / or utilized for future studies.

5.4.1 Pedagogical Implications

The findings of this study argue that the professional research article writers employ several stylistic patterns for writing each research article conventional section. The use of these patterns depends primarily on the functional properties and the textual variation. Findings from this dissertation could inform course designers of ESP / EAP curriculums of the mentioned dimensions especially in writing courses. The findings of this study could also be provided to teachers of English language in academic writing courses, novice and non-native researchers, and students particularly from these two disciplines for the application of the knowledge of this study to improve their writing skills. According to Thyler (2008), writing a publishable research article is not quite easy for novice and non-native researchers. The knowledge gained from this study about underlying stylistic patterns with their communicative functions in research articles would be beneficial to those researchers to confidently develop their own publishable research articles in the future. Moreover,

the differences of the findings between the two corpora could further provide, to the EAP teacher, with knowledge to teach students that, it is necessary to implement various stylistic patterns when writing research articles, since different disciplines have their owns patterns.

Teachers could advise students to study the language using a data-driven, inductive approach (Beatty, 2003 as cited in Getkham, 2010). With teacher encouragement, this process can both stimulate students' curiosity and encourage them to actively and independently engage with the language. Incorporating this strategy into the curriculum may help students read more efficiently and to eventually write with this style of discourse in order to increase the chance of having their papers accepted for publication.

In terms of lexico-grammatical features, there are several functions of modals to be taught. The corpora show that this feature plays an important role in academic writing since there are three main categories of modals – predictive modals, possibility modals, and necessity modals which provide different communicative functions. For example, possibility modals help denote the authors' assessment, necessity modals help convey the writer's obligation, and predictive modals help mark predictions of events or outcomes. Therefore, the student would likely benefit from being taught explicitly in their academic writing classes how and when to use these modals appropriately so that they are able to communicate meanings successfully.

Other lexico-grammatical features that should be taught explicitly are reduced adjective clauses, it-cleft, and type/token ratio: the importance in the academic genre emphasizes the necessity for students to acquire skills for the use of these features in their academic writing.

In the case of reduced adjective clauses, the students may become familiar with using a full adjective clause in a post-nominal position instead of using a reduced adjective clause; they have had more instruction and practice in how to form and when to use full adjective clauses, since these are introduced before the reduced adjective clauses in grammar books. Moreover, reduced adjective clauses could be very difficult for English language learners. Some students are not able to differentiate the followings i) present participle as part of the continuous form of a

verb and as an active form of a verb in a reduced adjective clause and ii) past participle as a passive form of a verb and as a passive form of a verb in a reduced adjective clause. This might be because the students might not have been taught about a reduced adjective clause, though the use of this feature may be built into their native intuition about what sounds right. Teachers should remind students of the choice between the full and reduced form, and indicate cases where an adjective clause should not be used at all. Teachers of EAP courses should engage students in practicing the use of reduced adjective clauses in their academic writing since it could help them write more economically with the limited pages of the research article. This begins with noticing usages of the features and being able to identify what makes these usages appropriate and effective. Also, students should practice noticing and correcting the absence of these features in cases where they are obligatory.

In terms of it-cleft (or dummy 'it'): the corpora show that the research article writers use this feature frequently. If the form and function of it-cleft were taught in academic composition courses, the students could utilize this construction more often and confidently in their writing. It-cleft is an effective device for emphasizing contrast, which is especially useful for argumentation in academic writing. Teachers ought to encourage students to utilize this feature in their writing by teaching them its specific purpose and giving them opportunities to practice its use in academic text. It may also be helpful to show students examples of it-clefts in published writing and then have students practice adding this structure to sample sentences without the appropriate emphasis. However, teachers should emphasize the disadvantages of over-use of this feature; to use it effectively, students have to be able to identify the appropriate context in which to use it.

In terms of type / token ratio: the ratio between the number of different lexical items in a text and the total number of words in that text (Biber, 1995), high TTR indicates that the text has a greater variety of words. Teachers should encourage students to develop their academic vocabulary, emphasizing that a wide range of vocabulary strengthens academic text by increasing the precision of their ideas.

The researcher deems that teachers can help students reinforce knowledge of these features and improve their ability to use them in writing through doing noticing activities similar to the technique introduced for teaching modals.

5.4.2 Implications for Further Research

It could be interesting to further investigate co-occurring patterns of lexico-grammatical features and dimensional differences across rhetorical moves in each conventional section or the whole research articles, and then compare them between two disciplines. Future research might explore how certain lexico-grammatical features are used in each research article conventional section e.g. how three types of modals: possibility, necessity, and predictive modals or two types of adjectives: attributive adjectives and predicative adjectives are used specifically in the Abstract.

Future research might be conducted to determine how the data-driven approach can best be facilitated in English for Academic Purposes or English for Specific Purposes instruction.

An additional area of future research is to delve deeper into the differences between native and non-native English academic writing by performing a rhetorical analysis in addition to linguistic features' analysis to determine whether stylistic patterns for writing research articles of two groups are similar or different.

An analysis of formulaic language in published academic writing would lend insight into the common collocations used by the professional research article writer. This would inform writing instructors of the specific examples of formulaic language that would be helpful for the student to use in their own academic text.

5.5 Conclusion

This dissertation applied a Biber's (1995) multidimensional analysis technique to investigate co-occurring patterns of lexico-grammatical features in the newly generated Nursing Research Article Corpus (NURAC) and Language Teaching Corpus (LTRAC). In NURAC, forty-eight lexico-grammatical features co-loaded to create four patterns and In LTRAC, forty-eight lexico-grammatical features co-occurred to form six patterns. Then, salient lexico-grammatical features, clustering on each pattern, were interpreted for their mutual communicative function. The four patterns found in NURAC were Evaluative Stance Focused, Established Knowledge Focused, Claim Focused, and Intention Focused. The six patterns revealed in LTRAC were Persuasion Focused, Evaluative Stance Focused, Claim Focused, Established

Knowledge versus Past Action Focused, Ownership Focused, and Modified Information Focused. Further intersectional comparisons by statistical analyses showed that some similarities and differences occurred across the research article's conventional sections in each corpus. Also, an interdisciplinary comparative analysis indicated that there were both similarities and discrepancies of the lexico-grammatical co-occurring patterns between the two corpora. In the researcher's opinion, this study contributed to the field of nursing and language teaching. This disparity points to implications that academic writing teachers should reinforce these stylistic patterns including their co-occurring lexico-grammatical features in ESP and EAP courses. Through continuing efforts to better improve our students' writing capabilities and to decrease shortfalls, teachers of English for Academic Purposes as well as English for Specific Purposes can help students reach their highest potential for success on their academic path. Furthermore, this newly unveiled body of knowledge will be beneficial to both non-native English and novice researchers. Becoming more familiar with the stylistic patterns used in this genre, they will be more confident to write their research articles in English and have research articles internationally published.

BIBLIOGRAPHY

Abdollahzadeh, E. (2011). Hedging in postgraduate student theses: A cross-cultural corpus study. *International Proceedings of Economics Development Research, 26,* 581-586.

Abdollahzadeh, E. (2012). Poring over the findings: Interpersonal authorial engagement in applied linguistics papers. *Journal of Pragmatics, 43*(1), 288-297.

Alvin, L. P. (2014). The passive voice in scientific writing: The current norm in science journals. *Science Communication, 13*(1), 1-16.

Amdur, R., Kirwan, J., & Morris, C. G. (2010). Use of the passive voice in medical journal articles, *American Medical Writers Association Journal*, *25*(3), 98-110.

Anderson, K. & Maclean, J. (1997). A genre analysis study of 80 medical abstracts. *Edinburgh Working Papers in Applied Linguistics, 8*(1), 1-23.

Angsuchote, S., Vichitwanna, S. & Pinyopanuwat, R. (2011). *Statistical analysis for social and behavioral research.* Bangkok: Mission Media.

Annesley, T. M. (2010). The discussion section: Your closing argument. *Clinical Chemistry, 56*(11), 1671-1674.

Atkinson, D. (1999). *Scientific discourse in socio-historical context*. London: Laurence Erlbaum.

Auria, M. P. (2008). Stance and academic promotionalism: A cross-disciplinary comparison in the soft sciences. *Journal of the Spanish Association of Anglo-American studies, 30*(1), 129-145.

Ayers, G. (2008). The evolutionary nature of genre: An investigation of the short texts accompanying research articles in the scientific journal Nature. *English for Specific Purposes, 27*(1), 22-41.

Azevedo, L. F. (2011). How to write a scientific paper: Writing the methods section. *Revista Portuguesa de Pneumologia*, *17*(5), 232-238.

Baoya, Z. (2015). *Moves and inter-move linguistic variation in education research articles* (Unpublished doctoral dissertation). Suranaree University of Technology, Suranaree Province.

Barr, S. M. (2006). *A student guide to natural science.* Wilmington: Intercollegiate Studies Institute.

Bartlett, M. S. (1950). Tests of significance in factor analysis. *British Journal of Psychology, 3*(2), 77-85.

Bazerman, C. (1984). The writing of scientific non-fiction. *Pre Text, 5*(1), 39-74.

Bazerman, C. (1988). Modern evolution of the experimental report in physics: Spectroscopic articles in physical review 1893-1980. *Social Studies of Science, 14*(1), 163-196.

Biber, D. (1990). Methodological issues regarding corpus-based analysis of linguistic variation. *Literary and Linguistic Computing, 5*(4), 257-269.

Biber, D. (1993). Representativeness in corpus design. *Literary and Linguistic Computing, 8*(4), 243-257.

Biber, D. (1993). Using register-diversified corpora for general language studies. *Computational Linguistics, 19*(2), 219-241.

Biber, D. (1995). *Variation across speech and writing.* Cambridge: Cambridge University Press.

Biber, D. (2002). On the complexity of discourse complexity: A multidimensional analysis. *Discourse Processes, 15*(1), 133-163.

Biber, D. (2003). Historical patterns for the grammatical marking of stance: A cross-register comparison. *Journal of Historical Pragmatics, 5*(1), 107-135.

Biber, D. (2004). *Modal use across registers and time*. Berlin: Mouton de Gruyter.

Biber, D. (2006). Stance in spoken and written university registers. *Journal of English for Academic Purposes, 5*(2), 97-116.

Biber, D. & Conrad, S. (2009). *Register, genre, and style.* Cambridge: Cambridge University Press.

Biber, D. & Finegan, E. (1994). *Intra-textual variation within medical research articles.* Amsterdam: Rodopi.

Biber, D. & Gray, B. (2010). Challenging stereotypes about academic writing: complexity, elaboration, and explicitness. Journal of English for Academic Purposes, 9(1), 2-20.

Biber, D., Connor, U., & Upton. T. A. (2009). *Discourse on the move: Using corpus analysis to describe discourse structure.* Amsterdam: John Benjamins.

Biber, D., Conrad, S., & Reppen. R. (1994). Corpus-based approaches to issues in applied linguistics. *Applied Linguistics, 15*(2), 169-189.

Biber, D., Conrad, S., & Reppen. R. (1996). Corpus-based investigations of language use. *Annual Review of Applied Linguistics, 16*(1), 115-136.

Biber, D., Conrad, S., & Reppen, R. (1998). *Corpus linguistics: Investigating language structure and use.* Cambridge: Cambridge University Press.

Biber, D., Conrad, S., & Viviana, C. (2004). If you look at lexical bundles in university teaching and textbooks. *Applied Linguistics, 25*(3), 371-405.

Biber, D., Conrad, S., Reppen, R., Byrd, P. and Helt, M. (2002). Speaking and writing in the university: A multi-dimensional comparison. *TESOL Quarterly, 36*(1), 9-48.

Biber, D., Davies, M., Jones, J. K. & Tracy-Ventura, N. (2006). Spoken and written register variation in Spanish: A multi-dimensional analysis. *Corpora, 1*(1), 7-38.

Biber, D., Johansson, S., Leech, G., Conrad, S., & Finegan, E. (1999). *Longman grammar of spoken and written English.* London: Longman.

Bitchener, J & Basturkman, H. (2006). Perceptions of the difficulties of postgraduate L2 thesis students writing the discussion section. *Journal of English for Academic Purposes, 5*(1), 4-18.

Boutellier, R., Gassmann, O., & Raeder, S. (2011). *What is the difference between social and natural sciences?.* Switzerland: University of St. Gallen.

Brett, P. (1994). A genre analysis of the results section of sociology articles. *English for Specific Purposes, 13*(1), 47-59.

Browner, W. S. (1999). *Publishing and presenting clinical research.* Baltimore: Williams and Wilkins.

Bruce, I. (2009). Results section in sociology and organic chemistry articles: A genre analysis. *English for Specific Purposes, 28*(2), 105-124.

Bryman, A. (2008). *Social research methods.* Oxford: Oxford University Press.

Burrough-Boenisch, J. (2003). Shapers of published NNS research articles. *Journal of Second Language Writing, 12*(3), 223-243.

Burrough-Boenisch, J. (2005). NS and NNS scientists' amendments of Dutch scientific English and their impact on hedging. *English for Specific Purposes, 24*(1), 25-39.

Burton, N. (2008). *Doing your education research project.* Los Angeles: Sage.

Butin, D. W. (2010). *The education dissertation: A guide for practitioner scholars*. Thousand Oaks: Corwin.

Canagarajah, A. S. (1999). *Resistance in ELT.* Oxford: Oxford University Press.

Cargil, M. & O'Connor, P. (2009). *Writing scientific research articles: Strategies and steps.* Australia: Wiley-Blackwell.

Carter, R. & McCarthy, M. (1995). Grammar and the spoken language. *Applied Linguistics, 16,* 141-158.

Carter, R., & McCarthy, M. (1997). *Exploring spoken English.* Cambridge: Cambridge University Press.

Carter, R. & McCarthy, M. (2006). *Cambridge grammar of English.* Cambridge: Cambridge University Press.

Carter, S. (2012). *Structuring your research thesis*. New York: Palgrave.

Carter-Thomas, S., & Chambers, A. (2012). *From text to corpus: A contrastive anaysis of first person pronouns in economics article introductions in English and french.* Philadelphia: John Benjamins.

Celce-Murcia, M. & Larsen-Freeman, D. (1999). *The grammar book.* Boston: Heinle & Heinle.

Charak, A. & Norouzi, Z. (2013). Rhetorical moves and verb tense in abstracts: A comparative analysis of American and Iranian academic writing. *International Journal of Language Studies, 7*(4), 101-110.

Charles, M. (2003). This mystery: A corpus-based study of the use of nouns to construct stance in theses from two contrasting disciplines. *Journal of English for Academic Purposes, 2*(4), 313-326.

Charles, M. (2006a). Phraseological patterns in reporting clauses used in citation: A corpus-based study of theses in two disciplines. *English for Specific Purposes, 25*(3), 310-331.

Charles, M. (2006b). The construction of stance in reporting clauses: A cross-disciplinary study of theses. *Applied Linguistics, 27*(3), 492-518.

Charles, M. (2007). Argument or evidence?: Disciplinary variation in the use of the noun that patterns. *English for Specific Purposes, 26*(2), 203-218.

Cho, S. (2004). Challenges of entering discourse communities through publishing in English: Perspectives of nonnative-speaking doctoral students in the United States of America. *Journal of Language, Identity, and Education, 3*(3), 47-72.

Connor, U. & Upton, T. A. (2013). *Language for specific purposes section, the encyclopedia of applied linguistics.* New York: John Wiley and Sons.

Conrad, S. (1996). Investigating academic texts with corpus based techniques: An example from Biology. *Linguistics and Education, 8*(1), 229-326.

Corson, T. & Smollett, R. (2013). *Passive voice: When to use it and when to avoid it.* Toronto: University of Toronto.

Corson, T. & Smollett, R. (2014). Writing at the University of Toronto. Retrieved from http://www.writing.utoronto.ca/advice/style-and-editing/passive-voice

Cortes, V. (2004). Lexical bundles in published and student disciplinary writing: Examples from history and biology. *English for Specific Purposes, 23*(4), 397-423.

Cortes, V. (2008). Genre and corpora in the English for academic writing class. *Oregon Teachers of English to other Language, 25*(1), 9-16.

Costello, R. B. (1997). *Macmillan dictionary.* New York: Simon & Schuster Books for Young Readers.

Crismore, A. & Vande Kopple, W.J. (1997). *Hedges and readers: Effects on attitudes and learning.* Berlin: Walter de Gruyter.

Daems, J., Speelman, D., & Ruette, T. (2013). Register analysis in blogs: Correlation between professional sector and functional dimensions. *Leuven Working Papers in Linguistics, 2*(1), 1-27

Day, R. A. (1989). The origins of the scientific paper: The IMRAD format. *American Medical Writer Association*, *4*(2), 16-18.

Day, R. A., & Gastel, B. (2012). *How to write and publish a scientific paper.* Cambridge: Cambridge University Press.

Dewey, M. (2008). *A classification and subject index for cataloguing and arranging the books and pamphlets of a library.* London: The Echo Library Press.

Dudley-Evans, T. (1998). *Developments in English for specific purposes: A multi-disciplinary approach.* Cambridge: Cambridge University Press.

Eastwood, J. (1999). Oxford Practice Grammar. Oxford: Oxford University Press.

ElMalik, A. & Nesi, H. (2008). Publishing research in a second language: The case of Sudanese contributors to international medical journals. *Journal of English for Academic Purposes, 7*(2), 87-96.

Field, A. (2000). *Discovering statistics using SPSS for Windows.* New Delhi: Sage.

Fisher J. P., Jansen, J. A., Johnson, P. C, & Mikos, A. G. (2014). *Guidelines for writing a research paper for publication.* Retrieved from http://www.liebertpub.com/media/pdf/English-Research-Article-Writing-Guide.pdf

Flottum, K., Dahl, T., & Kinn, T. (2006a). *Academic voices: Across languages and disciplines.* Philadelphia: John Benjamins.

Flottum, Dahl, T. K., & Kinn, T. (2006b). *We now report on…versus let us now see how author roles and interaction with readers in research articles.* New York: Peter Lang.

Flottum, K., Dahl, T., & Kinn, T. (2007). *Cultural identities and academic voices.* Newcastle upon Tyne: Cambridge Scholars Publishing.

Flottum, K., Dahl, T., & Kinn, T. (2013). KIAP-reflections on a Complex Corpus. *Bergen Language and Linguistics Studies, 3*(1), 137-150.

Flowerdew, J. (1999). Writing for scholarly publication in English: The case of Hong Kong. *Journal of Second Language Writing, 8*(2), 123-145.

Flowerdew, J. (2001). *Research perspectives on English for academic purposes.* Cambridge: Cambridge University Press.

Freihat, S. & Khalaf, A. M. (2012). The picture of workplace oral communication skills for ESP Jordanian business graduate employees. *International Journal of Business, Humanities and Technology, 11*(2), 117-145.

Friginal, E. (2009). *The language of outsource call center: A corpus based study of cross-cultural interaction.* Amsterdam: John Benjamin.

Galavotti, M.C. (2003). *Observation and experiment in the natural and social sciences.* Kluwer: Dordrecht.

Getkham, K. (2010). *A corpus-based study of applied linguistic research articles: A multidimensional analysis.* Research Report, National Institute of Development Administration.

Gjesdal, A.M. (2013). The influence of genre constraints on author representation in medical research articles. *Discours, 12*(1), 345-376.

Glasman-Deal, H. (2010). *Science research writing: for non-native speakers of English.* London: World Scientific.

Gledhill, C. (2000). The discourse function of collocation in research article introductions. *English for Specific Purposes, 19*(2), 115-135.

Gorsuch, R. L. (1983). *Factor analysis.* Hillsdale: Erlbaum.

Gozdz-Roszkowski, S. (2011). *Explorations across languages and corpora.* Bern: Peter Lang.

Grabe, W., & Kaplan, R.B. (1997). *Theory and practice of writing: An applied linguistic perspectives.* London: Longman.

Gray, B. (2010). On the use of demonstrative pronouns and determiners as cohesive devices: A focus on sentence-initial this/these in academic prose. *Journal of English for Academic Purposes, 9*(3), 167-183.

Gray, B. & Cortes, V. (2011). Perception vs. evidence: An analysis of this and these in academic prose. *English for Specific Purposes, 30*(1), 31-43.

Grieve, J. Biber, D., Friginal, E. & Nekrasova, T. (2008). *Variation among blogs: A multidimensional analysis*. New York: Springer-Verlag.

Gross, A. G., Harmon, J. E., & Reidy, M. (2002). *Communicating science: The scientific article from the 17th century to the present.* Oxford: Oxford University Press.

Grossmann, F. (2013). *Verbs and pronouns.* Rennes: Presses Universitaires de Rennes.

Guinovart, J. (2000). A multidimensional corpus-based analysis of English spoken and written-to-be-spoken discourse. *Cuadernos de Filologia Inglesa, 9*(1), 39-70.

Gunawardena, C. N. (1989). The present perfect in the rhetorical divisions of biology and biochemistry journal articles. *English for Specific Purposes Journal, 8*(2), 265-273.

Hair, J. F., Black, W. C., Babin, B., & Anderson, R. E. (2010). *Multivariate data analysis.* New Jersey: Prentice Hall.

Halliday, M. A. K. & Hasan, R. (1996). *Cohesion in English.* London: Longman.

Halliday, M. A. K. & James, Z. L. (1993). *A quantitative study of polarity and primary tense in the English finite clause.* London: Routledge.

Halliday, M. A. K. & Martin, J. R. (1994). *Writing science: Literacy and discursive power (critical perspectives on literacy and education).* London: Falmer.

Halliday, M. A. K. (1998). *Introduction to functional grammar.* London: Arnold.

Halliday, M. A. K. (2013). *Halliday's introduction to functional grammar*. London: Routledge.

Hanania, E. & Akhtar, K. (1985). Verb form and rhetorical function in science writing: A study of MS theses in biology, chemistry and physics. *English for Specific Purpose Journal, 4*(1), 49-58.

Hancock, D. R. & Bob, A. (2011). *Doing case study research: A practical guide for beginning researchers.* New York: Teachers College Press.

Hartwell, L. M. (2013). Corpus-informed descriptions: English verbs and their collocates in science abstracts. *Étudesendidactique des Langues, 20*(1), 79-94.

Hartwell, L. M. & Jacques, M. (2014). Authorial presence in French and English: "Pronoun + verb" patterns in biology and medicine research articles. *Discours, 15*(1), 213-245.

Harwood, N. (2005a). Nowhere has anyone attempted in this article I aim to do just that: A corpus-based study of self-promotional I and we in academic writing across four disciplines. *Journal of Pragmatics, 37*(8), 1207-1231.

Harwood, N. (2005b). We do not seem to have a theory the theory i present here attempts to fill this gap: Inclusive and exclusive pronouns in academic writing. *Applied Linguistics, 26*(3), 343-375.

Hasselgard, H., Lysvag, P. and Johansson, S. (2012). *English grammar: Theory and use.* Germany: Universitetsforlaget.

Hawes, T. & Thomas, S. (1997). Tense choices in citations. *Research in the Teaching of English, 31*(1), 394-414.

Henson R. K, & Roberts J. K. (2006). Use of Exploratory Factor Analysis in Published Research: Common Errors and Some Comment on Improved Practice. *Educational and Psychological Measurement, 66*(3), 237-278.

Heslot, J. (1982). *Tense and other indexical markers in the typology of scientific texts in English.* Copenhagen: Copenhagen School for Economics.

Hess, D. R. (2004). How to write an effective discussion. *Respiratory Care, 49*(10), 75-86.

Hewings, M. & Hewings, A. (2002). It is interesting to note that: A comparative study of anticipatory 'it' in student and published writing. *English for Specific Purposes, 21*(4), 367-383.

Hiltunen, T. (2010). *Grammar and disciplinary culture: A corpus-based study.* Helsinki: University of Helsinki.

Hirano, E. (2009). Research article introductions in English for specific purposes: A comparison between Brazilian Portuguese and English. *English for Specific Purposes, 28*(4), 240-250.

Holmes, R. (1997). Genre analysis and the social sciences: An investigation of the structure of research article discussion sections in three disciplines. *English for Specific Purposes, 16*(4), 321-337.

Hopkins, A. & Dudley-Evans, T. (1988). A genre-based investigation of the discussion sections in articles and dissertations. *English for Specific Purposes, 7*(2), 113-121.

Hunston, S. & Francis, G. (2002). *Pattern grammar: A corpus-driven approach to the lexical grammar of English.* Philadelphia: John Benjamins.

Hunston, S. & Sinclair, J. (2000). *A local grammar of evaluation.* Oxford: Oxford University Press.

Hunston, S. & Thompson, G. (2001). *Evaluation in text: Authorial stance and the construction of discourse.* Oxford: OUP.

Hunt, E. F. & Colander, D. C. (2008). *Social science: An introduction to the study of society.* Boston: Pearson Allyn and Bacon.

Huth. E. J. (1990). *How to write and publish papers in the medical sciences.* Baltimore: Williams & Wilkins.

Hyland, K. (1994). Hedging in academic writing and EAP textbooks. *English for Specific Purposes, 13*(3), 239-256.

Hyland, K. (1998). *Hedging in scientific research articles.* Amsterdam: John Benjamins.

Hyland, K. (1999). Talking to students: Metadiscourse in introductory course books. *English for Specific Purposes, 18*(1), 3-26.

Hyland, K. (2001). Humble servants of the discipline: Self-mention in research articles. *English for Specific Purposes, 20*(3), 207-226.

Hyland, K. (2002a). Authority and invisibility: Authorial identity in academic Writing. *Journal of Pragmatics, 34*(1), 109-112.

Hyland, K. (2002b). Specificity revisited: How far should we go?. *English for Specific Purposes, 21*(4), 385-395.

Hyland, K. (2004a). Disciplinary interactions: Metadiscourse in L2 postgraduate writing. *Journal of Second Language Writing, 13*(1), 133-151.

Hyland, K. (2004b). *Disciplinary discourses: Social interactions in academic writing.* Ann Arbor: University of Michigan Press.

Hyland, K. (2004c). *Patterns of engagement: Dialogic features and L2 undergraduate writing.* New York: Continuum.

Hyland, K. (2006). *Disciplinary differences: Language variation in academic discourses*. New York: Peter Lang.

Hyland, K. (2007). Genre pedagogy: Language, literacy and L2 writing instruction. *Journal of Second Language Writing, 16*(3), 148-164.

Hyland, K. (2008). As can be seen: Lexical bundles and disciplinary variation. *English for Specific Purposes, 27*(1), 4-21.

Hyland, K. (2012). *Disciplinary identities*. Cambridge: Cambridge University Press.

Hyland, K. & Diani, G. (2009). *Academic evaluation: Review genres in university settings.* Basingstoke: Palgrave.

Hyland, K. & Tse, P. (2005). Hooking the reader: A corpus study of evaluative that in abstracts. *English for Specific Purposes, 24*(2), 123-139.

Hyland, K. & Tse, P. (2007). Is there an 'academic vocabulary?. *TESOL Quarterly 41*(2), 235-253.

James, H. (2008). *Academic writing and publishing: A practical guide.* New York: Routledge.

Janet, H. (1994). Inferring language change from computer corpora: Some methodological problems. *International Computer Archive of Modern English*, *18*(8), 27-40.

Jeanne, F. (2011). Rhetorical pronouns & naming. Retrieved from http://www. writingrhetorics.com/2015/02/rhetorical-pronouns-naming.html

Jitpakdee, B. (2015). *Importance and type of nursing research.* Chaing Mai: Chaing Mai University.

Johns, A. M., & Dudley-Evans, T. (1991). English for specific purposes: International in scope, specific in purpose. *Teachers of English to Other Languages Quarterly*, *25*(2), 297-314.

Johns, A. M. (2008). Genre awareness for the novice student: An on-going quest. *Language Teaching*, *41*(2), 237-252.

Jolly, C. (1996). Hazards of the passive voice. *Nature, 381*(6585), 730-756.

Kanoksilapatham, B. (2003). *A corpus-based investigation of scientific research articles: Linking move analysis with multidimensional analysis* (Unpublished doctoral dissertation). Georgetown University, Washington, D.C.

Kanoksilapatham, B. (2005). Rhetorical structure of biochemistry research articles. *English for Specific Purposes, 24*(3), 269-292.

Kanoksilpatham, B. (2007). Writing scientific research articles in thai and english: similarities and difficulties. *Silpakorn University International Journal*, *7*(1), 172-203.

Kanoksilapatham, B. (2009). Generic characterization of civil engineering research article abstracts. *The Southeast Asian Journal of English Language Studies, 19*(3), 1-10.

Kaplan, R. B. & Baldauf, R. B. (2005). *Language planning from practice to theory*. Philadelphia: Multilingual Matters.

Kennedy, C. & Miceli, T. (2001). An evaluation of intermediate students' approaches to corpus investigation. *Language Learning & Technology, 5*(3), 77-90.

Kennedy, G., 1998. *An introduction to corpus linguistics.* London: Longman.

Kespratoom, S. & Kitjaroenpaiboon, W. (2007). *A study of passive and active voice constructions in educational administration research articles.* Research Report, Suan Dusit University.

Kettemann, B. & Marko, G. (2002). *Teaching and learning by doing corpus analysis.* Amsterdam: John Benjamins.

Kieffer, K. M. (1999). An introductory primer on the appropriate use of exploratory and confirmatory factor analysis. *Research in the Schools, 6*(2), 75-92.

Kim, J.W. (1999). Rhetorical functions of metadiscourse in EFL writing. *English Teaching, 54*(4), 3-25.

Kirkman, J. (1975). That pernicious passive voice. *Physical Technology*, *6*(1), 197-200.

Kolln, M. (2009). Rhetorical grammar. *English Journal, 4*(1), 25-30.

Kretchmer, P. (2003). *Twelve steps to writing an effective results section.* London: Sage.

Kretchmer, P. (2008). *Fourteen steps to writing an effective discussion section.* London: Sage.

Krishnan, T. E. M. (2013). *Structure of research article for journals.* Retrieved from http://www.slideshare.net/thrijil/structure-of-research-article-for-journal-publication-dr-thrijil-krishnan-e-m

Kumaravadivelu, B. (2007). Understanding language teaching: From method to post-method. *Teaching English as a Second or Foreign Language, 11*(3), 135-157.

Kuo, C.H. (1999). The use of person pronouns: Role relationships in scientific journal articles. *English for Specific Purposes, 18*(2), 121-138.

Lackstrom, J. E., Selinker, L., & Trimble, L. P. (1970). *Grammar and technical*. Philadelphia: The Center for Curriculum Development.

Lackstrom, J. E., Semer, L., & Trimble, L. P. (1973). Technical rhetorical principles and grammatical choice. *TESOL Quartery, 7*(1), 127-136.

Lagemaat, R. (2006). *Theory of knowledge for the diploma.* Cambridge: Cambridge University Press.

Leandre, R. F., Duane T. W., Robert C. M., & Erin J. S. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychology Methods, 4*(3), 272-299.

Leather, S. R. (1996). The case for the passive voice. *Nature, 381*(6582), 467-483.

Ledoux, S. F. (2002). Defining natural sciences. *Behaviorology Today, 5*(1), 24-37.

Lee, D. & Chen, S. X. (2009). Making a bigger deal of the smaller words: Function words and other key items in research writing by Chinese learners. *Journal of Second Language Writing, 18*(3), 149-165.

Leech, G. (1997). *Teaching and language corpora: A convergence.* New York: Addison Wesley Longman.

Lenko-Szymanska, A. (2004). *Demonstratives as anaphora markers in advanced learners' English.* Amsterdam: John Benjamins.

Li, L. J. & Ge, G. C. (2009). Genre analysis: Structural and linguistic evolution of the English-medium medical research articles (1995-2004). *English for Specific Purposes, 28*(2), 93-104.

Lim, J. M. H. (2005). *Reporting results in management journal articles.* Serdang: University Putra Malaysia Press.

Lim, J. M. H. (2006). Method sections of management research articles: A pedagogically motivated qualitative study. *English for Specific Purposes, 15*(2), 45-69.

Lim, J. M. H. (2010). Commenting on research results in applied linguistics and education: A comparative genre-based investigation. *Journal of English for Academic Purposes, 9*(4), 280-294.

Lim, J. M. H. (2011). Paving the way for research findings: Writers' rhetorical choices in education and applied linguistics. *Discourse Studies, 13*(6), 725-749.

Loi, C. K. & Evans, M. S. (2010). Cultural differences in the organization of research article introductions from the field of educational psychology: English and Chinese. *Journal of Pragmatics, 42*(10), 2814–2825.

Loi, C. K. (2010). Research article introductions in Chinese and English: A comparative genre-based investigation. *Journal of English for Academic Purposes, 9*(4), 267-279.

Lores, R. (2004). On RA abstracts from the structure to thematic organization. *English for Specific Purposes, 23*(3), 280-302.

Louwerse, M. M., McCarthy, P. M., McNamara, D. S. & Graesser, A. C. (2004). *Variation in language and cohesion across written and spoken registers.* Mahwah: Erlbaum.

Lunenburg, F. C. (2008). *Writing a successful thesis or dissertation: Tips and strategies for students in the social and behavioral sciences*. Thousand Oaks: Corwin Press.

Luzon, M. J. (2009). The use of we in a learner corpus of reports written by EFL engineering students. *Journal of English for Academic Purposes, 8*(3), 192-206.

Malcolm, L. (1987). What rules govern tense usage in scientific articles?. *English for Specific Purposes Journal, 6*(1), 31-43.

Marco, M. J. (2000). Collocational frameworks in medical research papers: A genre-based study. *English for Specific Purposes, 19*(1), 63-86.

Martin, J. R. & Rose, D. (2008). *Genre relations: Mapping culture*. London: Equinox.

Martin, J. R., Matthiessen, M. I. M., & Painter, C. (1997). *Working with functional grammar.* London: Hodder Arnold

Martin-Martin, P. (2003). A genre analysis of English and Spanish research paper abstracts in experimental social sciences. *English for Specific Purposes, 22*(1), 25-43.

Martinez, I. A. (2005). Native and non-native writers' use of first person pronouns in the different sections of biology research articles in English. *Journal of Second Language Writing, 14*(3), 174-190.

Master, P. (2002). *Relative clause reduction in technical research articles.* New Jersey: Lawrence Erlbaum Association.

Matthews, J. R. & Matthews, R.W. (2007). *Successful scientific writing: A step-by-step guide for the biological and science writing.* Cambridge: Cambridge University Press.

Matthews, P. H. (2007). *Oxford concise dictionary of linguistics.* Oxford: Oxford University Press.

Mauranen, A. (2008). *Hybrid voices: English as the lingua franca of academics.* Oxford: Oxford University Press.

McCarthy, M. (1994). *Advances in written text analysis.* New York: Routledge.

McCarthy, M. & Carter, R. (1995). Spoken grammar: What is it and how can we teach it?. *ELT Journal, 49*(3), 207-218.

McEnery, T. & Wilson, A. (1996). *Corpus linguistics.* Edinburgh: Edinburgh University Press.

Merriam-Webster. (2013). *Merriam-webster's collegiate dictionary.* Springfield, MA: Merriam-Webster Incorporated.

Millar, N., Budgell, B., & Fuller, K. (2013). Use the active voice whenever possible: The impact of style guidelines in medical journals. *Applied Linguistics, 34*(4), 393-414.

Miller, C. & Harris, J. (2004). Scholarly journal publication: Conflicting agendas for scholars, publishers, and institutions. *Journal of Scholarly*, *33*(1), 73-91.

Mosteller, F., Nave, B., & Miech, E. J. (2004). Why we need a structured abstract in educational research. *Educational Researcher, 33*(1), 29-34.

Muhlhausler, P. & Harre, R. (1990). *Pronouns and people: The linguistic construction of social and personal identity.* Oxford: Blackwell.

Myers, G. (1994). *Words in ads.* England: Hodder Education.

Myers, G. (1997). The pragmatics of politeness in scientific articles. *Applied Linguistics, 10*(1), 1-35.

Neuendorf, K. A. (2002). *The content analysis guidebook.* California: Sage.

Ngowu, K. N. (1997). The medical research paper: Structure and functions. *English for Specific Purposes, 16*(2), 119-138.

Niko, B. (1994). Involvement in linguistic practice: An ethnographic appraisal. Journal of Pragmatics, 22(2), 279-299.

Nini, A. (2015). Multidimensional analysis tagger (1.3). Retrieved from http://sites.google.com/site/multidimensionaltagger

Oakes, M. (1998). *Statistics for corpus linguistics.* Edinburgh: Edinburgh University Press.

Oh, S. (2009). Korean college students' use of English demonstratives in argumentative essays. *English Teaching, 64*(1), 51-78.

Oh, S. (2012). This and these in Korean graduate students' academic writing. *Language Research, 48*(3), 715-750.

Okasha, S. (2002). *Philosophy of science: A very short introduction.* Oxford: Oxford University Press.

O'Keefe, A., McCarthy, M., & Carter, R. (2007). *From corpus to classroom.* Cambridge: Cambridge University Press.

Ormes, R. V. (1957). Passive voice. *Science, 125*(3247), 529-567.

Oster S. (1981). The use of tenses in reporting past literature in EST. *English for Specific Purposes, 26*(1), 25-38.

Oxford English dictionary. (2013). (13th ed.). London: Oxford University Press.

Pallant, J. (2007). *SPSS survival guide: A step by step guide to data analysis using SPSS for windows*. New York: Open University Press.

Paltridge, B. (1997). *Genre, frames and writing in research settings.* Amsterdam and Philadelphia: John Benjamins.

Paltridge, B. (2001). *Genre and the language learning classroom.* Ann Arbor: University of Michigan Press.

Paltridge, B. (2013). *Genre and English for specific purposes.* Boston: Wiley-Blackwell.

Paltridge, B. & Starfield, S. (2007). *Thesis and dissertation writing in a second language.* London: Routledge.

Peacock, M. (2002). Communicative moves in the discussion section of research articles. *System, 30*(2), 479-497.

Peacock, M. (2011). The structure of the method section in research articles across eight disciplines. *The Asian ESP Journal, 7*(2), 97-124.

Peng, J. F. (1987). *An investigation of rhetorical and organizational features of the discussion sections of chemical engineers' papers*. U.K.: University of Birmingham.

Petch-Tyson, S. (2000). *Demonstrative expressions in argumentative discourse: A computer corpus-based comparison of non-native and native English.* Amsterdam: John Benjamins.

Pett, M. A, Lackey N. R, & Sullivan J. J. (2003). *Making sense of factor analysis: The use of factor analysis for instrument development in health care research.* California: Sage.

Pho, P. D. (2008). Research article abstracts in applied linguistics and educational technology: A study of linguistic realizations of rhetorical structure and authorial stance. *Discourse Studies, 10*(1), 231-254.

Porter, J. (1992). *Audience and rhetoric: An archaeological composition of the discourse community.* New Jersey: Prentice Hall.

Porter, K. L. (2005). *The frequency and function of passive voice use in nurses' notes.* Washington, D.C.: University of North Carolina Wilmington.

Posteguillo, S. (1999). The schematic structure of computer science research articles. *English for Specific Purposes, 18*(2), 139-160.

Precht, K. (2000). *Patterns of stance in English.* Washington, D.C.: Northern Arizona University.

Quirk, R., Greenbaum, S., Leech, G., and Svartvik, J. (1995). *A grammar of contemporary English language.* Harlow: Longman.

Raimes, A. (1987). *Exploring through writing: A process approach to ESL composition.* New York: St. Martin's Press.

Redman, P. (2011). *Writing introductions in good essay writing: A social sciences guide.* London: Sage.

Richards, J., Platt, J., & Platt, H. (1992). *Dictionary of language teaching and applied linguistics.* Harlow: Pearson Education Limited.

Rietveld, T. & Van Hout, R. (1993). *Statistical techniques for the study of language and language behavior.* New York: Mouton de Gruyter.

Riley, K. (1991). Passive voice and rhetorical role in scientific writing. *Journal of Technical Writing and Communication, 21*(3), 239-257.

Rizzo, C. R. (2009). Wireless: Some facts and figures from a corpus-driven study. International Journal of English Studies, 7(2), 91-114.

Robert, S. D. (1994). *How to write and publish a scientific paper*. Phoenix: Oryx Press.

Rodman, L. (1994). The active voice in scientific articles: frequency and discourse functions. *Journal of Technical Writing and Communication, 24*(3), 309-331.

Rowena, M. & Moore, S. (2006). *The handbook of academic writing: A fresh approach.* New York: Open University Press.

Ruben, D. L., Pedro, V. M. & Guillermo, M. (2015). The scree test and the number of factors: A dynamic graphics approach. Spanish Journal of Psychology, 18(11), 1-10.

Ruiying, Y. & Allison, D. (2003). Research articles in applied linguistics: moving from results to conclusions. *English for Specific Purposes, 22*(4), 365-385.

Rule, J. B. (1997). *Theory and progress in social science.* Cambridge: Cambridge University Press.

Salager-Meyer, F. (1992a). A text-type and move analysis study of verb tense and modality distribution in medical English abstracts. *English for Specific Purposes, 11*(2), 93-113.

Salager-Meyer, F. (1992b). Discoursal flaws in medical English abstracts: A genre analysis per research. *Text, 10*(4), 365-384.

Salager-Meyer, F. (1993). Imprecision and vagueness (hedging) in today´s medical discourse: courtesy, coyness or necessity?. *The ESPecialist, 14*(1), 1-15.

Salager-Meyer, F. (1994). Hedges and textual communicative function in medical English written discourse. *English for Specific Purposes, 13*(2), 149-170.

Salager- Meyer, F. (1997). *I think that perhaps you should: A study of hedges in written scientific discourse.* Washington: United States Information Agency English Language Programs.

Samraj, B. (2002). Introductions in research articles: Variations across disciplines. *English for Specific Purposes, 21*(1), 1-17.

Samraj, B. (2004). Discourse features of the student-produced academic research paper: Variations across disciplinary courses. *Journal of English for Academic Purposes, 3*(2), 5-22.

Samraj, B. (2005). An exploration of a genre set: research article abstracts and introductions in two disciplines. *English for Specific Purposes, 24*(1), 141-156.

Sancho-Guinda, C. & Hyland, K. (2012). *Stance and voice in written academic genres.* Basingstoke: Palgrave.

Santos, M. B. (1996). The textual organization of research paper abstracts in applied linguistics. *Text, 16*(4), 481-499.

Sauaia, A. (2013). The anatomy of an article: the discussion section: "how does the article I read today change what I will recommend to my patients tomorrow?. *The Journal of Trauma and Acute Care Surgery, 74*(6), 1599-1602.

Schafer, M. S. (2009). *Writing the Discussion: Writing in Psychology course syllabus.* Florida: University of Florida.

Schmid, H. (2000). English abstract nouns as conceptual shells: From corpus to cognition. Berlin: Mouton de Gruyter.

Schramm A. (1996). Using aspect to express viewpoint in EST text. *English for Specific Purposes, 15*(2), 141-168.

Seidlhofer, B. (2004). Research perspectives on teaching English as a lingua franca. *Annual Review of Applied Linguistics, 24*(1), 209-239.

Seidlhofer, B. (2009). Common ground and different realities: World Englishes and English as a lingua franca. *World Englishes, 28*(2), 236-245.

Seoane, E. (2013). On the conventionalization and loss of pragmatic function of the passive in late modern English scientific discourse, *Journal of Historical Pragmatics, 14*(1), 70-99.

Sevastopoulos, J. (2015). Statement clauses: Restate quoted speech. Retrieved from http://www.grammar-quizzes.com/nounclause4.html.

Sheldon, E. (2011). Rhetorical differences in RA Introductions written by English L1 and L2 and Castilian L1 writers accepted by the Journal of English for Academic Purposes. *Journal of English for Academic Purposes, 10*(1), 238-251.

Sigel, T. (2009). How passive voice weakens your scholarly argument. *Journal of Management Development, 28*(5), 478-480.

Silvia, P. J. (2007). *How to write a lot: A practical guide to productive academic writing.* Washington, DC: American Psychological Association.

Sinclair, J. (1991). *Corpus, concordance, and collocation.* Oxford: Oxford University Press.

Singleton, R. A. & Straits, B. C. (1988). *Approaches to social research.* Oxford: Oxford University Press.

Smith, E. & Bernhardt, S. (1997). *Writing at work.* New York: McGraw-Hill.

Soler, V. (2002). Analyzing adjectives in scientific discourse: An exploratory study with educational applications for Spanish speakers at advance university level. *English for Specific Purposes, 21*(2), 145-165.

Soler-Monreal, C., Carbonell-Olivares M., Gil-Salom, L. (2011). A contrastive study of the rhetorical organisation of English and Spanish PhD thesis introductions. *English for Specific Purposes, 30*(1), 4-17.

Sollaci, B. L. & Pereira, M. G. (2004). The introduction, methods, results, and discussion (IMRAD) structure: A fifty-year survey. *Journal of Medical Library Association*, *92*(3), 364-371.

Southgate, D.A.T. (1995). The structure of scientific papers. *British Journal of Nutrition, 74*(5), 605-606.

Srisatitnarangkul, B. (2011). *Research methodology in nursing sciences.* Bangkok: U and Intermedia.

Stoller, F. L. & Robinson, M. S. (2013). Chemistry journal articles: An interdisciplinary approach to move analysis with pedagogical aims. *English for Specific Purposes, 32*(1), 45-57

Strauss, S. (1993). Why ‘this’ and ‘that’ are not complete without ‘it. *Regional Meeting of the Chicago Linguistic Society, 29*(1), 403-417.

Strauss, S. (2002). This, that, and it in spoken American English: A demonstrative system of gradient focus. *Language Sciences, 24*(2), 131-152.

Strevens, P. (1988). *ESP after twenty years: A re-appraisal*. Ho Chi Minh: SEAMEO Regional Language Centre.

Stubbs, M. (1996). *Text and corpus analysis.* Oxford: Blackwell.

Sun, Y. C. (2003). Learning process, strategies and web-based concordancers: A case-study. *British Journal of Educational Technology, 34*(5), 601-613.

Suntara, W. & Usaha, S. (2013). Research article abstracts in two related disciplines: rhetorical variation between linguistics and applied linguistics. *English Language Teaching, 6*(2), 84-99.

Susan, S. (2012). *Structuring your research thesis.* New York: Palgrave Macmillan.

Swales, J. M. (2004). *Genre analysis: English in academic and research settings.* Cambridge: Cambridge University Press.

Swales, J. M. & Najjar, H. (1987). The writing of research article introductions. *English Language Teaching, 4*(2), 175-191.

Swales, J. M. (1992). *Aspects of article introductions*. Michigan: University of Michigan.

Swales, J. M. (2004). *Research genre: Explorations and applications.* New York: Cambridge University Press.

Swales, J. M. (2005). Attended and unattended "this" in academic writing: A long and unfinished story. *ESP Malaysia, 11*(3), 1-15.

Swales, J. M. & Feak, C. B. (2000). *English in today's research world: A writing guide.* Ann Arbor: University of Michigan Press.

Swales, J. M. & Feak, C. B. (2004). *Academic writing for graduate students.* Ann Arbor: University of Michigan Press.

Swales, J. M., & Rogers, P. (1995). Discourse and the projection of corporate culture: The mission statement. *Discourse and Society, 6*(2), 223-242.

Swan, M. (1996). *Practical English usage.* Oxford: Oxford University Press.

Sword, H. (2012). *Stylish academic writing.* Cambridge: Harvard University Press.

Tabachnick, B. G & Fidell, L.S. (2007). *Using multivariate statistics.* Boston: Pearson Education.

Tadros, A. (1985). *Prediction in text.* Birmingham: English Language Research.

Tang, R. & John, S. (1999). The ''I'' in identity: Exploring writer identity in student academic writing through the first person pronoun. *English for Specific Purposes, 18*(3), 23-39.

Tardy, C. M. (2011). *ESP and multi method approaches to genre analysis.* Ann Arbor: University of Michigan Press.

Tarone, E., Dwyer, S., Gillette, S., & Icke, V. (1998). On the use of the passive and active voice in astrophysics journal papers: With extensions to other languages and other fields. *English for Specific Purposes, 17*(1), 113-132.

Tarone, E., Sharon, D., Susan, G., & Vincent, I. (1981). On the use passive in two astrophysics journal papers. *English for Specific Purposes, 1*(2), 123-140.

Taylor, J. R. (2001). *Linguistic categorization: Prototypes in linguistic theory.* Beijing: Foreign Language Teaching and Research Press.

Taylor, J. R. (2002). *Cognitive grammar.* New York: Oxford University Press.

Tessuto, G. (2015). Generic structure and rhetorical moves in English-language empirical law research articles: Sites of interdisciplinary and interdiscursive cross-over. *English for Specific Purposes, 37*(2), 13-26.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications.* Washington, DC: American Psychological Association.

Thompson, D. (1994) Arguing for experimental "facts" in science: A study of research article results sections in biochemistry. *Written Communication, 8*(1), 106-128.

Thompson, K. (2013). Using automated and fine-grained analysis of pronoun use as indicators of progress in an online collaborative project. *International Conference Proceedings of CSCL 2013*, 45-67.

Thompson, P. (2000). *Citation practices in PhD theses.* Frankfurt: Peter Lang.

Thompson, A. J. & Martinet, A.V. (1993). *A practical English grammar.* New York: Oxford University Press.

Thyer, B. A. (2008). *Preparing research articles.* New York: Oxford University Press.

Tingen, M. S., Burnett, H. A., Murchinson, R. B., & Zhu, H. (2009). The importance of nursing. *Journal of Nursing Education, 48*(3), 167-170.

Todorovic, G. (2003). *Writing biomedical texts in English II: Correct use of verbs.* Serbia: National Library of Serbia.

Trimble, M. T. & Trimble, L. (1982). Rhetorical-grammatical features of scientific and technical texts as a major factor in written ESP communication. *Proceedings of the Third European Symposium on LSP,* pp. 199-216.

Trimble, L. (1985). *English for science and technology: A discourse approach.* Cambridge: Cambridge University Press.

Trigg, R. (2001). *Understanding social science: A philosophical introduction to the social sciences.* Malden: Blackwell Publishers.

Tse, P, & Hyland, K. (2006). So what is the problem this book addresses?: Interactions in book reviews. *Text and Talk, 27*(2), 767-790.

Tse, P, & Hyland, K. (2008). Robot Kung Fu: Gender and the performance of a professional identity. *Journal of Pragmatics, 40*(7), 1232-1248.

Tse, P, & Hyland, K. (2010). Claiming a territory: Relative clauses in journal descriptions. *Journal of Pragmatics, 42*(1), 1880-1889.

Tutin, A. (2009). Evaluative adjectives in academic writing in the humanities and social sciences. Retrieved from http://w3u-grenoble3.fr/lidilem/lobo/file/ evalative_adjectives 2008_tutin.pdf.

Vande Kopple, W. (1998). Relative clauses in spectroscopic articles in the physical review, beginnings and 1980. *Written Communication, 15*(2), 254-276.

Varttala, T. (1999). Remarks on the communicative functions of hedging in popular scientific and specialist research articles on medicine. *English for Specific Purposes, 18*(2), 177-200.

Vassileva, I. (2001). Commitment and detachment in English and Bulgarian academic writing. *English for Specific Purposes, 20*(1), 83-102.

Ventola, E. (1997). *Abstracts as an object of linguistic study.* Tubingen: Gunter Narr.

Victoria, E. M. (1997). *Writing papers in the biological sciences.* Boston: Bedford Books.

Vincent, N. G. (2010). Supervised noun phrase coreference research: The first fifteen years. *Proceedings of ACL,* 1396-1411.

Vold, E. T. (2006). *The choice and use of epistemic modality markers in linguistics and medical research articles.* New York: Peter Lang.

Wang, S. (1991). *A corpus study of English conditionals.* Wellington: Victoria University of Wellington.

Weissberg, R., & Buker, S. (1990). *Writing up research: Experimental research report writing for students of English.* New Jersey: Prentice Hall.

White, H. D. (2004). Citation analysis and discourse analysis revisited. *Applied Linguistics, 25*(1), 89-116.

Widdowson, H. G. (1979). *The description in scientific language*. New York: Oxford University Press.

Wilkinson, J. A. M. (1992). Jargon and the passive voice: Prescriptions and proscriptions for scientific writing. *Written Communication, 22*(2), 319-325.

Williams, I. A. (1999). Results section of medical research articles: An analysis of rhetorical categories for pedagogical purposes. *English for Specific Purposes, 18*(1), 347-366.

Wu, F. (2011a). Frequency issues of classifier configurations for processing Mandarin object-extracted relative clauses: A corpus study. *English for Specific Purposes, 7*(2), 203-227.

Wu, J. (2011b). Improving the writing of research papers: IMRAD and beyond. *Landscape Ecology*, *26*(10), 1345-1349.

Yang, L. (2014). Examining the mediational means in collaborative writing: Case studies of undergraduate ESL students in business courses. *Journal of Second Language Writing, 23*(2), 74-89.

Yang, R. & Allison, D. (2003). Research articles in applied linguistics: moving from results to conclusions. *English for Specific Purposes, 22*(4), 365-385.

Yellin, L. L. (2009). *A sociology writer's guide*. Boston: Allyn and Bacon.

Yoon, H. & Hirvela, A. (2004). ESL student attitudes towards corpus use in L2 writing. *Journal of Second Language Writing, 13*(3), 257-283.

Zhang, Y. (2014). A corpus based analysis of lexical richness of Beijing Mandarin speakers: Variable identification and model construction. *Language Sciences, 44*(5), 60-69.

Zinsser, W. K. (2006). *On writing well: The classic guide to writing nonfiction.* New York: Harper Collins.

APPENDICES

Appendix A

Sources of the Two Corpora

T1 Chen,Y., Liu, Z., Zhang, J., Xu, K., Zhang, S., Wei, D., & Zhang, Z. (2014). Altered brain activation patterns under different working memory loads in patients with type 2. *Diabetes Care*, 37(12), 3157-3163. doi: 10.2337/dc14-1683

T2 Tang, T. S., Funnell, M., Sinco, B., Piatt, G., Palmisano, G., Spencer, M.S., Kieffer, E.C., & Heisler, M. (2014). Comparative effectiveness of peer leaders and community health workers in diabetes self-management support: Results of a randomized controlled trial. *Diabetes Care,* 37(6), 1525-1534. doi: 10.2337/dc13-2161

T3 Henry, J. J., Gerald, M. M.V., Anton F. J. H., Patrick, M. N., Wim, J. G., & Cees J. T. (2014). Diabetes-related distress, insulin dose, and age contribute to insulin-associated weight gain in patients with type 2 diabetes: Results of a prospective study. *Diabetes Care*, 37(10), 2710-2717, doi: 10.2337/dc13-1205

T4 Andrew, J. K., Shantanu, N., Melissa, M. P., Howard, H. M., & Elbert, S. H. (2014). Incidence of remission in adults with type 2 diabetes: The diabetes and aging study. *Diabetes Care,* 37(12), 3188-3195, doi: 10.2337/dc14-0874

T5 Soren, L, Jan, S. J.ensen, Sune, H. P., Soren, G., Jan, F., Allan, F., Mette, B., & Rasmus M. (2014). Low adiponectin levels and increased risk of type 2 diabetes in patients with myocardial infarction. *Diabetes Care,* 37(11). 3003-3008. doi: 10.2337/dc14-0932.

T6 Schiavon, M., Dalla, M. C., Kudva, Y. C., Basu, A., & Cobelli, C. (2014). Quantitative estimation of insulin sensitivity in type 1 diabetic subjects wearing a sensor-augmented insulin pump. *Diabetes Care*, 37(5), 1216-1223. doi: 10.2337/dc13-1120.

T7 Salome, A. R., Hiromi, K., Cynthia, C., Nasheen, N., Andrew, O. O., Woon-Puay, K., Lesley, M. B., Jian-Min, Y., & Rob, M. V. D. (2014). Amount, type, and sources of carbohydrates in relation to ischemic heart disease mortality in a Chinese population: a prospective cohort study. *American Journal of Clinical Nutrition,* 100(1), 53 – 64. doi: 10.3945/ ajcn.113.076273

T8 Hauff, L. E., Leonard, S. A. & Rasmussen, K. M. (2014). Associations of maternal obesity and psychosocial factors with breastfeeding intention, initiation, and duration. *American Journal of Clinical Nutrition,* 99(3), 524-534. doi: 10.3945/ajcn.113.071191.

T9 Carol, L. B., Naiman, A. K., Jim, M. M., Lauren, B. R., Eric, S. D., Davis, R. M., Mark, R. S., Arthur, F. K., Charles, H. H., & Neal, J. C. (2014). Dietary lipids are differentially associated with hippocampal-dependent relational memory in prepubescent children. *American Journal of Clinical Nutrition,* 99(5), 1026-1032. doi: 10.3945/ajcn.113.079624.

T10 Yu-Cheng, L., Pi-Feng, C., Mei-Hwei, C., & Yen-Hsuan, N. (2014). Genetic variants in GCKR and PNPLA3 confer susceptibility to nonalcoholic fatty liver disease in obese individuals. *American Journal of Clinical Nutrition,* 99(4), 869-874. doi: 10.3945/ajcn.113.079749.

T11 Marlieke,V., Hans, W. M. N., Wouter, E. M. K., Riccardo, C., Willem, W., Paul, A. M. L., & Bas A. J. M. (2014). Nutrition before, during, and after surgery increases the arginine: Asymmetric dimethylarginine ratio and relates to improved myocardial glucose metabolism: A randomized controlled trial. *American Journal of Clinical Nutrition,* 99(6), 1440-1449. doi: 10.3945/ajcn.113.075473.

T12 Masic,U. & Yeomans, M. R. (2014). Umami flavor enhances appetite but also increases satiety. *American Journal of Clinical Nutrition,* 100(2), 532-538. doi: 10.3945/ajcn.113.080929.

T13 Tatsushi, M., Ken, K., Shunsuke, T., Yasuyuki, T., Akifumi, S., & Tatsuya, I. (2014). Early intensive versus minimally invasive approach to postoperative hemodynamic management after subarachnoid hemorrhage. *Stroke,* 45, 1280-1284. doi: 10.1161/STROKEAHA.114.004739.

T14 Ellis, S. V. E., Eitan, A., Kellen, E. H., Alison, M. A., Anastasia, V., Kristin, M. S., Jonathan, R., Anand, V., Steven, M. G., & Edip, G. M. (2014). Incidence of symptomatic hemorrhage in patients with lobar microbleeds. *Stroke,* 45, 2280-2285. doi: 10.1161/STROKEAHA.114.005151.

T15 Gattringer, T., Ferrari, J., Knoflach, M., Seyfang, L., Horner, S., Niederkorn, K., Culea, V., Beitzke, M., Lang, W., Enzinger, C., & Fazekas, F. (2014). Sex-related differences of acute stroke unit care results from the Austrian stroke unit registry. *Stroke,* 45, 1632-1638. doi:10.1161/STROKEAHA.114.004897.

T16 Anders, M. G., Morten, D., Casper, N. B., Kenneth, E., & Simon, R. (2014). Stroke in patients with aortic stenosisthesimvastatin and ezetimibe in aortic stenosis study. *Stroke,* 45, 1939-1946. doi: 10.1161/STROKEAHA.114.005296.

T17 David, S. L., Reza, J., Raul, G. N., Tudor, G. J., Helmi, L. L., & Jeffrey, L. S. (2014). Serial Alberta stroke program early CT score from baseline to 24 hours in solitaire flow restoration with the intention for thrombectomy study a novel surrogate end point for revascularization in acute stroke for the swift investigators. *Stroke,* 45, 723-727. doi: 10.1161/STROKEAHA.113.003914.

T18 Hu, Q., Liang, X., Chen, D., Chen, Y., Doycheva, D., Tang, J., Tang, J., & Zhang, J. H. (2014). Delayed hyperbaric oxygen therapy promotes neurogenesis through reactive oxygen species/hypoxia-inducible factor-1α/β-catenin pathway in middle cerebral artery occlusion rats. *Stroke,* 45, 1807-1814. doi: 10.1161/STROKEAHA.114.005116.

T19 Vladimir, C., Christina, W. H., Camilla, W., Flaminia, C., Guia, G., Marco , S., Alan, A., Judit, B., Romuald, B., Paul, C., Doina, Cosman., Christian, H., Miriam, I., Michael, K., Jean, P. K., Helen, K.,Vita, P., Pilar, S., Airi, V., & Danuta, W. (2014). A newly identified group of adolescents at 'invisible' risk for psychopathology and suicidal behavior: Findings from the SEYLE study. World *Psychiatry,* 13(1), 78-86. doi: 10.1002/wps.20088.

T20 Debra L. F., Andrew, M., Vera, A. M., Gerald, F. W., John, J. M., David, J. C., Anna, W., & Cherrie, A. G. (2014). Predictors of type 2 diabetes in a nationally representative sample of adults with psychosis.*World Psychiatry,* 13(2), 176-183. doi: 10.1002/wps.20130.

T21 Chesney, E., Goodwin, G. M., & Fazel, S. (2014). Risks of all-cause and suicide mortality in mental disorders: A meta-review. *World Psychiatry,* 13(2), 152-160. doi: 10.1002/wps.20128.

T22 Silvana, G., Alessandro, R., Paola, R., Alessandro, B., Armida, M., Paola, B., Paola, R., Dino, G., Eugenio, A., Mario, A., Antonello, B., Massimo, B., Roberto, B., Liliana, D., Diana, D. R., Gabriella, D. E., Massimo, D. G., Andrea, F., Carlo, M., Palmiero, M. (2014). The influence of illness-related variables, personal resources and context-related factors on real-life functioning of people with schizophrenia. *World Psychiatry,* 13(3), 275-287. doi: DOI: 10.1002/wps.20167.

T23 Calkins, M. E., Moore, T. M., Merikangas, K. R., Burstein, M., Satterthwaite, T. D., Bilker, W.B., Ruparel, K., Chiavacci, R., Wolf, D. H., Mentch, F., Qiu, H., Connolly, J. J., Sleiman, P. A., Hakonarson, H., Gur, R. C, Gur, R. E. (2014). The psychosis spectrum in a young u.s. community sample: Findings from the Philadelphia neurodevelopmental cohort. *World Psychiatry,* 13(3), 296-305. doi: 10.1002/wps.20152.

T24 Ingrid, K., Claudia, J. P. S., Jessica, A. H., Claudia, M., Wolfgang, V., Frenk, P., Koen, S., Alex, L. B., Inez, M., Philippe, D., Jim, O., & Marieke, W. (2104). Therapeutic application of the experience sampling method in the treatment of depression: a randomized controlled trial. *World Psychiatry*, 13(1), 68-87. doi: 10.1002/wps.20090.

T25 Shana E. M., Meaghan, A. M., Samantha, G. H., Loredana, F., Mirko, I. H., David, M. S., Bijoy, J. T., Martin, T., Kyle, M., Steven, K. G., and Amy, F. (2104). Effects of exercise and lifestyle modification on fitness, insulin resistance, skeletal muscle oxidative phosphorylation and intramyocellular lipid content in obese children and adolescents. *Pediatric Obesity*, 9(4), 281-291. doi: 10.1111/j.2047-6310.2013. 00180.x.

T26 Priego, T., Sánchez, J., Picó, C., Ahrens, W., Bammann, K., Stefaan, D. H. U., Fraterman, A., Iacoviello, L., Lissner, L., & Molnár, D. (2014). Influence of breastfeeding on blood-cell transcript-based biomarkers of health in children. *Pediatric Obesity*, 9(6), 463-470. doi: 10.1111/j.2047-6310.2013.00204.x

T27 Goldberg, S., Werbeloff, N., Fruchter, E., Portuguese, S., Davidson, M., & Weise, M. (2014). IQ and obesity in adolescence: A population-based, cross-sectional study. *Pediatric Obesity*, 9(6), 419-426. doi: 10.1111/j.2047-6310.2013.00203.x

T28 Lundgren. M., Morgarden, E., & Gustafsson, J. (2014). Is obesity a risk factor for impaired cognition in young adults with low birth weight? *Pediatric Obesity*, 9(5), 319-326. doi: 10.1111/j.2047-6310.2013.00188.x

T29 Schmidt, M. C., Andersen, A. M. N., Due, P., Neelon, S. B., Gamborg, M., & Sørensen, T. L. A. (2014).Timing of motor milestones achievement and development of overweight in childhood: A study within the Danish national birth cohort. *Pediatric Obesity*, 9(4), 239-248. doi: 10.1111/j.2047-6310.2013.00177.x

T30 Graves, L., Garnett, S. P., Cowell, C. T., Baur, L. A., Ness, A., Sattar, N., & Lawlor, D. A. (2014). Waist-to-height ratio and cardiometabolic risk factors in adolescence: Findings from a prospective birth cohort. *Pediatric Obesity,* 9(5), 327-338. doi: 10.1111/j.2047-6310.2013.00192.x

T31 Polio, C. & Mark, S. C. (2014). An investigation into current measures of linguistic accuracy in second language writing research. *Journal of Second Language Writing,* 26(2014), 10-27. doi: 10.1016/j.esp.2013.12.078

T32 Friginal, E. & Weigle, S. (2014). Exploring multiple profiles of L2 writing using multi-dimensional analysis. *Journal of Second Language Writing,* 26 (2014), 80-95.

T33 Seloni, L. (2014). ‘‘I’m an artist and a scholar who is trying to find a middle point’: A textographic analysis of a Colombian art historian’s thesis writing. *Journal of Second Language Writing,* 25(2014), 79-99.

T34 Evans, N. W., Hartshorn, J. K., Cox, T. L., & Martin, D. J. T. (2014). Measuring written linguistic accuracy with weighted clause ratios: A question of validity. *Journal of Second Language Writing,* 24(2014), 33-50.

T35 McDonough, K., Crawford, W., & Vleeschauwer, J. D. (2014). Summary writing in a Thai EFL university context. *Journal of Second Language Writing,* 24(2014), 20-32.

T36 Yang, L. (2014). Examining the mediational means in collaborative writing: Case studies of undergraduate ESL students in business courses. *Journal of Second Language Writing,* 23(2014), 74-89.

T37 Crosthwaite, P. R. (2014). Definite discourse–New reference in L1 and L2: A study of bridging in Mandarin, Korean, and English. *Language Learning,* 64(3), 456-492. doi: 10.1111/lang.12062

T38 Kahng, J. (2014). Exploring utterance and cognitive fluency of L1 and L2 English speakers: Temporal measures and stimulated recall. *Language Learning,* 64(4), 809-854. doi: 10.1111/lang.12084.

T39 Compernolle, R. A. & Henery, A. (2014). Instructed concept appropriation and L2 pragmatic development in the classroom. *Language Learning,* 64(3), 549-578. doi: 10.1111/lang.12054.

T40 Elgort, I. & Warren, P. (2014). L2 vocabulary learning from reading: explicit and tacit lexical knowledge and the role of learner and item variables. *Language Learning,* 64(2), 365-414. doi: 10.1111/lang.12052.

T41 Rama, N., Catherine, C., Sarah, F., & Robert, J. H. (2014). The development of antonym knowledge in American Sign Language (ASL) and its relationship to reading comprehension in English. *Language Learning,* 64(4), 749-770. doi: 10.1111/lang.12078.

T42 White, L., Floccia, C., Goslin, J., & Butler, J. (2014). Utterance-final lengthening is predictive of infants' discrimination of English accents. *Language Learning,* 64(2), 27-44. doi: 10.1111/lang.12060.

T43 Pryor, E. & Woodward-Kron, R. (2014). International medical graduate doctor to doctor telephone communication: A genre perspective. *English for Specific Purposes,* 35(2014), 41-53. doi: 10.1016/j.esp.2013.12.001

T44 Graves, H., Moghaddasi, S., & Hashim, A. (2014). "Let G = (V, E) be a graph": Turning the abstract into the tangible in introductions in mathematics research articles. *English for Specific Purposes,* 36(2104), 1-11. doi: 10.1016/j.esp.2013.12.078

T45 Gollin-Kies, S. (2014). Methods reported in ESP research articles: A comparative survey of two leading journals. *English for Specific Purposes,* 36(2014), 27-34. doi: 10.1016/j.esp.2013.12.095

T46 Gimenez, J. (2014). Multi-communication and the business English class: Research meets pedagogy. *English for Specific Purposes,* 35(2014), 1-16. doi: 10.1016/j.esp.2013.12.046

T47 Ockey, G. J. (2014). The potential of the L2 group oral to elicit discourse with a mutual contingency pattern and afford equal speaking rights in an ESP context. *English for Specific Purposes,* 35(2014), 17-29. doi: 10.1016/j.esp.2013.12.056

T48 Koester, A. (2014). “We'd be prepared to do something, like if you say…” Hypothetical reported speech in business negotiations. *English for Specific Purposes*, 36(2014), 35-46. doi: 10.1016/j.esp.2013.12.084

T49 Yvette, C..& Roca, D. L. J. (2014). Exploring the role played by error correction and models on children’s reported noticing and output production in an L2 writing task. *Study in Language Acquisition,* 36, 451-485. doi:10.1017/S0272263113000612.

T50 Foster, P., Bolibaugh, C., & Kotula, A. (2014). Knowledge of nativelike selections in an L2: The influence of exposure, memory, age of onset, and motivation in foreign language and immersion settings. *Study in Language Acquisition,* 36, 101–132 .doi:10.1017/S0272263113000624.

T51 Seppo, V., Anneli, P., & Jukka, H. (2014). L1 and L2 word recognition in Finnish: Examining L1 effects on L2 processing of morphological complexity and morphophonological transparency. *Study in Language Acquisition*, 36, 133 -162. doi:10.1017/S0272263113000478.

T52 Ortega-Llebaria, M. (2014). L2 English innotation: Relations between form-meaning associations, access to meaning, and L1 transfer. *Study in Language Acquisition*, 36, 331-353. doi:10.1017/S0272263114000011.

T53 Reichle, R. V. (2014). Processing focus structure in L1 and L2 French L2 proficiency effects on ERPS. *Study in Language Acquisition*, 36, 535 – 564. doi:10.1017/S0272263113000594.

T54 Gut, U. & Pilai, S. (2014). Prosodic marking of information structure by Malaysian speakers of English. *Study in Language Acquisition*, 36, 283 – 302. doi:10.1017/S0272263113000739.

T55 Kemp, N., Wood, C., & Waldron, S. (2014). Do I know its wrong: Children’s and adults’ use of unconventional grammar in text messaging?. *Reading and Writing*, 27, 1585–1602. doi:10.1007/s11145-014-9508-1.

T56 Graham, S. & Santangelo, T. (2014). Does spelling instruction make students better spellers, readers, and writers? A meta-analytic review. *Reading and Writing*, 27, 1703–1743. doi: 10.1007/s11145-014-9517-0.

T57 Chlapana, E. & Tafa, E. (2014). Effective practices to enhance immigrant kindergarteners' second language vocabulary learning through storybook reading. *Reading and Writing*, 27, 1619–1640. doi: 10.1007/s11145-014-9510-7.

T58 Spear-Swerling, L. & Zibulsky, J. (2014). Making time for literacy: Teacher knowledge and time allocation in instructional planning. *Reading and Writing*, 27, 1353–1378. doi: 10.1007/s11145-013-9491-Y.

T59 Nanda, A. O., Greenberg, D., & Morris, R. D. (2014). Reliability and validity of the Ctopp elision and blending words subtests for struggling adult readers. *Reading and Writing*, 27, 1603–1618. doi: 10.1007/s11145-014-9509-0.

T60 Claire, M., Fletcher-Flinn, G. Brian, T., Megumi, Y., & Makiko, N. (2014). Unrecognized Cultural Conventions for Assessing Word Reading that Affect Research and Practice. *Reading and Writing*, 27, 1641–1655. doi: 10.1007/s11145-014-9511-6

Appendix B

Reliability Check of the Four Conventional Sections in the Articles

Intercoder 1: Kwanhathai Cheodchoo (Ph.d.)

Text	Introduction	Methods	Results	Discussion
T1	✓	✓	✓	✓
T2	✓	✓	✓	✓
T3	✓	✓	✓	✓
T4	✓	✓	✓	✓
T5	✓	✓	✓	✓
T6	✓	✓	✓	✓
T7	✓	✓	✓	✓
T8	✓	✓	✓	✓
T9	✓	✓	✓	✓
T10	✓	✓	✓	✓
T11	✓	✓	✓	✓
T12	✓	✓	✓	✓
T13	✓	✓	✓	✓
T14	✓	✓	✓	✓
T15	✓	✓	✓	✓
T16	✓	✓	✓	✓
T17	✓	✓	✓	✓
T18	✓	✓	✓	✓
T19	✓	✓	✓	✓
T20	✓	✓	✓	✓
T21	✓	✓	✓	✓
T22	✓	✓	✓	✓
T23	✓	✓	✓	✓

T24	✓	✓	✓	✓
T25	✓	✓	✓	✓
T26	✓	✓	✓	✓
T27	✓	✓	✓	✓
T28	✓	✓	✓	✓
T29	✓	✓	✓	✓
T30	✓	✓	✓	✓
T31	✓	✓	✓	✓
T32	✓	✓	✓	✓
T33	✓	✓	✓	✓
T34	✓	✓	✓	✓
T35	✓	✓	✓	✓
T36	✓	✓	✓	✓
T37	✓	✓	✓	✓
T38	✓	✓	✓	✓
T39	✓	✓	✓	✓
T40	✓	✓	✓	✓
T41	✓	✓	✓	✓
T42	✓	✓	✓	✓
T42	✓	✓	✓	✓
T43	✓	✓	✓	✓
T44	✓	✓	✓	✓
T45	✓	✓	✓	✓
T46	✓	✓	✓	✓
T47	✓	✓	✓	✓
T48	✓	✓	✓	✓
T49	✓	✓	✓	✓
T50	✓	✓	✓	✓
T51	✓	✓	✓	✓
T52	✓	✓	✓	✓
T53	✓	✓	✓	✓

T54	✓	✓	✓	✓
T55	✓	✓	✓	✓
T56	✓	✓	✓	✓
T57	✓	✓	✓	✓
T58	✓	✓	✓	✓
T59	✓	✓	✓	✓
T60	✓	✓	✓	✓

Intercoder 2: Sompoet Panawas (Ph.d.)

Text	Introduction	Methods	Results	Discussion
T1	✓	✓	✓	✓
T2	✓	✓	✓	✓
T3	✓	✓	✓	✓
T4	✓	✓	✓	✓
T5	✓	✓	✓	✓
T6	✓	✓	✓	✓
T7	✓	✓	✓	✓
T8	✓	✓	✓	✓
T9	✓	✓	✓	✓
T10	✓	✓	✓	✓
T11	✓	✓	✓	✓
T12	✓	✓	✓	✓
T13	✓	✓	✓	✓
T14	✓	✓	✓	✓
T15	✓	✓	✓	✓
T16	✓	✓	✓	✓
T17	✓	✓	✓	✓
T18	✓	✓	✓	✓
T19	✓	✓	✓	✓
T20	✓	✓	✓	✓
T21	✓	✓	✓	✓

T22	✓	✓	✓	✓
T23	✓	✓	✓	✓
T24	✓	✓	✓	✓
T25	✓	✓	✓	✓
T26	✓	✓	✓	✓
T27	✓	✓	✓	✓
T28	✓	✓	✓	✓
T29	✓	✓	✓	✓
T30	✓	✓	✓	✓
T31	✓	✓	✓	✓
T32	✓	✓	✓	✓
T33	✓	✓	✓	✓
T34	✓	✓	✓	✓
T35	✓	✓	✓	✓
T36	✓	✓	✓	✓
T37	✓	✓	✓	✓
T38	✓	✓	✓	✓
T39	✓	✓	✓	✓
T40	✓	✓	✓	✓
T41	✓	✓	✓	✓
T42	✓	✓	✓	✓
T42	✓	✓	✓	✓
T43	✓	✓	✓	✓
T44	✓	✓	✓	✓
T45	✓	✓	✓	✓
T46	✓	✓	✓	✓
T47	✓	✓	✓	✓
T48	✓	✓	✓	✓
T49	✓	✓	✓	✓
T50	✓	✓	✓	✓
T51	✓	✓	✓	✓

T52	✓	✓	✓	✓
T53	✓	✓	✓	✓
T54	✓	✓	✓	✓
T55	✓	✓	✓	✓
T56	✓	✓	✓	✓
T57	✓	✓	✓	✓
T58	✓	✓	✓	✓
T59	✓	✓	✓	✓
T60	✓	✓	✓	✓

Intercoder 3: Chayapon Chomchaiya (Ph.d.)

Text	Introduction	Methods	Results	Discussion
T1	✓	✓	✓	✓
T2	✓	✓	✓	✓
T3	✓	✓	✓	✓
T4	✓	✓	✓	✓
T5	✓	✓	✓	✓
T6	✓	✓	✓	✓
T7	✓	✓	✓	✓
T8	✓	✓	✓	✓
T9	✓	✓	✓	✓
T10	✓	✓	✓	✓
T11	✓	✓	✓	✓
T12	✓	✓	✓	✓
T13	✓	✓	✓	✓
T14	✓	✓	✓	✓
T15	✓	✓	✓	✓
T16	✓	✓	✓	✓
T17	✓	✓	✓	✓
T18	✓	✓	✓	✓
T19	✓	✓	✓	✓

T20	✓	✓	✓	✓
T21	✓	✓	✓	✓
T22	✓	✓	✓	✓
T23	✓	✓	✓	✓
T24	✓	✓	✓	✓
T25	✓	✓	✓	✓
T26	✓	✓	✓	✓
T27	✓	✓	✓	✓
T28	✓	✓	✓	✓
T29	✓	✓	✓	✓
T30	✓	✓	✓	✓
T31	✓	✓	✓	✓
T32	✓	✓	✓	✓
T33	✓	✓	✓	✓
T34	✓	✓	✓	✓
T35	✓	✓	✓	✓
T36	✓	✓	✓	✓
T37	✓	✓	✓	✓
T38	✓	✓	✓	✓
T39	✓	✓	✓	✓
T40	✓	✓	✓	✓
T41	✓	✓	✓	✓
T42	✓	✓	✓	✓
T42	✓	✓	✓	✓
T43	✓	✓	✓	✓
T44	✓	✓	✓	✓
T45	✓	✓	✓	✓
T46	✓	✓	✓	✓
T47	✓	✓	✓	✓
T48	✓	✓	✓	✓
T49	✓	✓	✓	✓

T50	✓	✓	✓	✓
T51	✓	✓	✓	✓
T52	✓	✓	✓	✓
T53	✓	✓	✓	✓
T54	✓	✓	✓	✓
T55	✓	✓	✓	✓
T56	✓	✓	✓	✓
T57	✓	✓	✓	✓
T58	✓	✓	✓	✓
T59	✓	✓	✓	✓
T60	✓	✓	✓	✓

Intercoder 4: Apiradee Polprasert (Ph.d.)

Text	Introduction	Methods	Results	Discussion
T1	✓	✓	✓	✓
T2	✓	✓	✓	✓
T3	✓	✓	✓	✓
T4	✓	✓	✓	✓
T5	✓	✓	✓	✓
T6	✓	✓	✓	✓
T7	✓	✓	✓	✓
T8	✓	✓	✓	✓
T9	✓	✓	✓	✓
T10	✓	✓	✓	✓
T11	✓	✓	✓	✓
T12	✓	✓	✓	✓
T13	✓	✓	✓	✓
T14	✓	✓	✓	✓
T15	✓	✓	✓	✓
T16	✓	✓	✓	✓
T17	✓	✓	✓	✓

T18	✓	✓	✓	✓
T19	✓	✓	✓	✓
T20	✓	✓	✓	✓
T21	✓	✓	✓	✓
T22	✓	✓	✓	✓
T23	✓	✓	✓	✓
T24	✓	✓	✓	✓
T25	✓	✓	✓	✓
T26	✓	✓	✓	✓
T27	✓	✓	✓	✓
T28	✓	✓	✓	✓
T29	✓	✓	✓	✓
T30	✓	✓	✓	✓
T31	✓	✓	✓	✓
T32	✓	✓	✓	✓
T33	✓	✓	✓	✓
T34	✓	✓	✓	✓
T35	✓	✓	✓	✓
T36	✓	✓	✓	✓
T37	✓	✓	✓	✓
T38	✓	✓	✓	✓
T39	✓	✓	✓	✓
T40	✓	✓	✓	✓
T41	✓	✓	✓	✓
T42	✓	✓	✓	✓
T42	✓	✓	✓	✓
T43	✓	✓	✓	✓
T44	✓	✓	✓	✓
T45	✓	✓	✓	✓
T46	✓	✓	✓	✓
T47	✓	✓	✓	✓

T48	✓	✓	✓	✓
T49	✓	✓	✓	✓
T50	✓	✓	✓	✓
T51	✓	✓	✓	✓
T52	✓	✓	✓	✓
T53	✓	✓	✓	✓
T54	✓	✓	✓	✓
T55	✓	✓	✓	✓
T56	✓	✓	✓	✓
T57	✓	✓	✓	✓
T58	✓	✓	✓	✓
T59	✓	✓	✓	✓
T60	✓	✓	✓	✓

Appendix C

Lexico-Grammatical Tags and their Examples

Tag	Represents	Examples
AMP	Amplifiers	This tag finds any of the items in this list: absolutely, altogether, completely, enormously, entirely, extremely, fully, greatly, highly, intensely, perfectly, strongly, thoroughly, totally, utterly, very.
ANDC	Independent clause coordination	This tag is assigned to the word and when it is found in one of the following patterns: I) preceded by a comma and followed by it, so, then, you, there + BE, or a demonstrative pronoun (DEMP) or the subject forms of a personal pronouns; II) preceded by any punctuation; III) followed by a WH pronoun or any WH word, an adverbial subordinator (CAUS, CONC, COND, OSUB) or a discourse particle (DPAR) or a conjunct (CONJ).
AWL	Average word length	Mean length of the words in the text in orthographic letters. A word is any string separated by space in the text tokenized by the Stanford Tagger 18.0
BEMA	Be as main verb	BE is tagged as being a main verb in the following pattern: BE followed by a determiner (DT), or a possessive pronoun (PRP$) or a preposition (PIN) or an adjective (JJ). This algorithm was improved in the present tagger by taking into account that adverbs or negations can appear between the verb BE and the rest of the pattern. Furthermore, the algorithm was slightly modified and improved: (a) the problem of a double-coding of any Existential there followed by a form of BE as a BEMA was solved by imposing the condition that there should not

		appear before the pattern; (b) the cardinal numbers (CD) tag and the personal pronoun (PRP) tag were added to the list of items that can follow the form of BE.
BYPA	By-passives	The tagger assigns this tag every time the patterns for PASS are found and the preposition by follows it.
CAUS	Causative adverbial subordinators	This tag identifies any occurrence of the word because.
CONC	Concessive adverbial subordinators	This tag identifies any occurrence of the words although and though. Biber's algorithm was improved by including the abbreviation tho.
COND	Conditional adverbial subordinators	This tag identifies any occurrence of the words if and unless.
CONJ	Conjuncts	This tag finds any of the items in this list: punctuation + else, punctuation + altogether, punctuation + rather, alternatively, consequently, conversely, e.g., furthermore, hence, however, i.e., instead, likewise, moreover, namely, nevertheless, nonetheless,notwithstanding, otherwise, similarly, therefore, thus, viz., in comparison, in contrast, inparticular, in addition, in conclusion, in consequence, in sum, in summary, for example, forinstance, instead of, by contrast, by comparison, in any event, in any case, in other words, asa result, as a consequence, on the contrary, on the other hand. Some minor inconsistencies in the said list were fixed. For example, Biber lists the word rather two times in this list, making the second mentions redundant. Rather was counted only when it appeared after a punctuation mark. The same applies for altogether. In cases of multiword units such as on the other hand, only the first word is tagged as OSUB and the other words are tagged

		with the tag NULL.
CONT	Contractions	The contractions were tagged by identifying any instance of apostrophe followed by a tagged word OR any instance of the item n't.
DEMO	Demonstratives	A demonstrative is found when the words that, this, these, those have not been tagged as either DEMP, TOBJ, TSUB, THAC, or THVC.
DEMP	Demonstrative pronouns	The program tags as demonstrative pronouns the words those, this, these when they are followed by a verb (any tag starting with V) or auxiliary verb (modal verbs in the form of MD tags or forms of DO or forms of HAVE or forms of BE) or a punctuation mark or a WH pronoun or the word and. The word that is tagged as a demonstrative pronoun when it follows the said pattern or when it is followed by 'sor is and, at the same time, it has not been already tagged as a TOBJ, TSUB, THAC or THVC.
DPAR	Discourse particles	The program tags as discourse particles the words well, now, anyhow, anyways preceded by a punctuation mark.
DWNT	Downtoners	This tag finds any of the items in this list: almost, barely, hardly, merely, mildly, nearly, only, partially, partly, practically, scarcely, slightly, somewhat. The word almost was classified byBiber as being both a hedge and a downtoner. In the present tagger almost is considered adowntoner only.
EMPH	Emphatics	This tag finds any of the items in this list: just, really, most, more, real+adjective, so+adjective, any form of DO followed by a verb, for sure, a lot, such a. In cases of multiword units such as a lot, only the first word is tagged as OSUB and the other words are tagged with the tag NULL.
EX	Existential there	Existential there is tagged by the Stanford Tagger as EX

		(for further reference: http://catalog.ldc.upenn.edu/docs/ LDC99T42/tagguid1.pdf).
FPP1	First person pronouns	Any item of this list: I, me, us, my, we, our, myself, ourselves.
GER	Gerunds*	The program tags as gerunds any nominal form (N) that ends in –ingor –ings. To improve the accuracy, only words longer than 10 characters are considered as gerunds.
HDG	Hedges	This tag finds any of the items in this list: maybe, at about, something like, more or less, sort of, kind of (these two items must be preceded by a determiner (DT), a quantifier (QUAN), acardinal number (CD), an adjective (JJ or PRED), a possessive pronouns (PRP$) or WH word(see entry on WH-questions)). In cases of multi-word units such as more or less, only the firstword is tagged as HDG and the other words are tagged with the tag NULL.
INPR	Indefinite pronouns	Any item of this list: anybody, anyone, anything, everybody, everyone, everything, nobody, none, nothing, nowhere, somebody, someone, something.
JJ	Attributive adjectives	Biber (1988) specifies that attributive adjectives were counted when an adjective was followed by another adjective or a noun. However, Biber states that also all the adjectives that were not identified as predicative were counted as attributive adjectives. Therefore, the present tagger does not have an algorithm to identify attributive adjectives. All the adjectives that the Stanford Tagger has already tagged as JJ, JJS, or JJR are considered attributive adjectives and are all re-assigned to the tag JJ. The predicative adjectives are tagged by another algorithm and therefore distinguished from the rest.
NEMD	Necessity modals	The necessity modals listed by Biber (1988): ought, should, must.

NN	Total other nouns	Any noun that has been tagged by the Stanford Tagger as NN and that has not been identified a nominalization or a gerund is left as such. Plural nouns (NNS) and proper nouns (NNP and NNPS) tags are changed to NN and included in this count.
NOMZ	Nominalizations	Any noun ending in -tion, -ment, -ness, or -ity, plus the plural forms. Although Biber (1988) does not mention that this variables was checked manually, it is likely that a stop list was used to avoid obviously erroneous tagging (e.g. city). However, this was not indicated in the appendix of Biber (1988).
OSUB	Other adverbial subordinators	This tag identifies any occurrence of the words: since, while, whilst, whereupon, whereas, whereby, such that, so that (followed by a word that is neither a noun nor an adjective), such that (followed by a word that is neither a noun nor an adjective), inasmuch as, forasmuch as, insofar as, insomuch as, as long as, as soon as. In cases of multi-word units such as as long as, only the first word is tagged as OSUB and the other words are tagged with the tag NULL.
PASS	Agentless passives	This tag is assigned when one of the two following patterns is found: (a) any form of BE followed by a participle (VBN or VBD) plus one or two optional intervening adverbs (RB) or negations; (b) any form of BE followed by a nominal form (a noun, NN, NNP or personal pronoun, PRP) and a participle (VBN or VBD). This algorithm was slightly changed from Biber's version in the present tagger. It was felt necessary to implement the possibility of an intervening negation in the pattern (b). This tag is therefore assigned also in the cases in which a negation precedes the nominal form of pattern (b).

PASTP	Past participial clauses	This tag is assigned when the following pattern is found: a punctuation mark followed by apast participial form of a verb (VBN) followed by a preposition (PIN) or an adverb (RB).(e.g. Built in a single week, the house would stand for fifty years)
PEAS	Perfect aspect	This is calculated by counting how many times a form of HAVE is followed by: a VBD or VBN tag (a past or participle form of any verb). These are also counted when an adverb (RB) or negation (XX0) occurs between the two. The interrogative version is counted too. This is achieved by counting how many times a form of HAVE is followed by a nominal form (noun, NN, proper noun, NP or personal pronoun, PRP) and then followed by a VBD or VBN tag. As for the affirmative version, the latter algorithm also accounts for intervening adverbs or negations.
PHC	Phrasal coordination	This tag was assigned for any and that is preceded and followed by the same tag and when this tag is either an adverb tag, or an adjective tag, or a verb tag or a noun tag.
IN	Total prepositional phrases	This tag identifies any occurrence of the prepositions listed by Biber (1988) under this category. As described in the section on infinitives, the preposition to is disambiguated by the infinitive marker to. Biber (1988) does not specifies whether he included any instance of the word to or he distinguished the two grammatical functions of this word. However, it was felt the distinction needed to be applied to the present tagger for improved accuracy.
PIRE	Pied-piping relative clauses	This tag is assigned when the following pattern is found: any preposition (PIN) followed by who, who, whose or which. (e.g. the manner in which he was told)
PIT	Pronoun it	Any pronoun it. Although not specified in Biber (1988), the present program also tags its and itself as “Pronoun it”.

PLACE	Place adverbials	Any item in this list: aboard, above, abroad, across, ahead, alongside, around, ashore, astern, away, behind, below, beneath, beside, downhill, downstairs, downstream, east, far, hereabouts, indoors, inland, inshore, inside, locally, near, nearby, north, nowhere, outdoors, outside, overboard, overland, overseas, south, underfoot, underground, underneath, uphill, upstairs, upstream, west. If an item is tagged by the Stanford Tagger as a proper noun (NNP),this is not tagged as place adverbial.
POMD	Possibility modals	The possibility modals listed by Biber (1988): can, may, might, could.
PRED	Predicative adjectives	The tagger tags as PRED the adjectives that are found in the following pattern: any form of BE followed by an adjective (JJ) followed by a word that is NOT another adjective, anadverb (RB) or a noun (N). If any adverb or negation is intervening between the adjective and the word after it, the tag is still assigned. A modification to Biber's algorithm wasimplemented in the present tagger to improve its accuracy. An adjective is tagged as predicative if it is preceded by another predicative adjective followed by a phrasal coordinator (see below). This pattern accounts for cases such as: the horse is big and fast.
PRESP	Present participial clauses	This tag is assigned when the following pattern is found: a punctuation mark is followed by a present participial form of a verb (VBG) followed by a preposition (PIN), a determiner (DT,QUAN, CD), a WH pronoun, a WH possessive pronoun (WP$), any WH word, any pronoun (PRP) or any adverb (RB).
PRIV	Private verbs	This tag finds any of the items listed by Quirk et al. (1985: 1181–2): accept, accepts, accepting, accepted, anticipate, anticipates, anticipating, anticipated, ascertain,

		ascertains,ascertaining, ascertained, assume, assumes, assuming, assumed, believe, believes, believing, believed, calculate, calculates, calculating, calculated, check, checks, checking, checked, conclude, concludes, concluding, concluded, conjecture, conjectures, conjecturing, conjectured, consider, considers, considering, considered, decide, decides, deciding, decided, deduce, deduces, deducing, deduced, deem, deems, deeming, deemed, demonstrate,demonstrates, demonstrating, demonstrated, determine, determines, determining, determined, discern, discerns, discerning, discerned, discover, discovers, discovering, discovered, doubt, doubts, doubting, doubted, dream, dreams, dreaming, dreamt, dreamed, ensure, ensures, ensuring, ensured, establish, establishes, establishing, established, estimate, estimates, estimating, estimated, expect, expects, expecting, expected, fancy, fancies, fancying, fancied, fear, fears, fearing, feared, feel, feels, feeling, felt, find, finds, finding, found, foresee, foresees, foreseeing, foresaw, forget, forgets, forgetting, forgot, forgotten, gather, gathers, gathering, gathered, guess, guesses, guessing, guessed, hear, hears, hearing, heard, hold,holds, holding, held, hope, hopes, hoping, hoped, imagine, imagines, imagining, imagined, imply, implies, implying, implied, indicate, indicates, indicating, indicated, infer, infers,inferring, inferred, insure, insures, insuring, insured, judge, judges, judging, judged, know, knows, knowing, knew, known, learn, learns, learning, learnt, learned, mean, means, meaning, meant, note, notes, noting, noted, notice, notices, noticing, noticed, observe, observes, observing, observed, perceive, perceives, perceiving, perceived, presume,presumes, presuming,

		presumed, presuppose, presupposes, presupposing, presupposed, pretend, pretend, pretending, pretended, prove, proves, proving, proved, realize, realise,realising, realizing, realises, realizes, realised, realized, reason, reasons, reasoning, reasoned, recall, recalls, recalling, recalled, reckon, reckons, reckoning, reckoned,recognize, recognise, recognizes, recognises, recognizing, recognising, recognized, recognised, reflect, reflects, reflecting, reflected, remember, remembers, remembering,remembered, reveal, reveals, revealing, revealed, see, sees, seeing, saw, seen, sense, senses, sensing, sensed, show, shows, showing, showed, shown, signify, signifies, signifying, signified, suppose, supposes, supposing, supposed, suspect, suspects, suspecting, suspected, think, thinks, thinking, thought, understand, understands, understanding, understood.
PRMD	Predictive modals	The predictive modals listed by Biber (1988): will, would, shall and their contractions:‘d_MD, ll_MD, wo_MD, sha_MD.
PROD	Pro-verb do	Any form of DO that is used as main verb and, therefore, excluding DO when used asauxiliary verb. The tagger tags as PROD any DO that is NOT in neither of the followingpatterns: (a) DO followed by a verb (any tag starting with V) or followed by adverbs (RB),negations and then a verb (V); (b) DO preceded by a punctuation mark or a WH pronoun (thelist of WH pronouns is in Biber (1988)).
PUBV	Public verbs	This tag finds any of the items listed by Quirk et al. (1985: 1180–1): acknowledge,acknowledged, acknowledges, acknowledging, add, adds, adding, added, admit, admits,admitting, admitted, affirm, affirms, affirming, affirmed, agree, agrees, agreeing, agreed,allege, alleges,

		alleging, alleged, announce, announces, announcing, announced, argue,argues, arguing, argued, assert, asserts, asserting, asserted, bet, bets, betting, boast, boasts,boasting, boasted, certify, certifies, certifying, certified, claim, claims, claiming, claimed,comment, comments, commenting, commented, complain, complains, complaining,complained, concede, concedes, conceding, conceded, confess, confesses, confessing,confessed, confide, confides, confiding, confided, confirm, confirms, confirming, confirmed,contend, contends, contending, contended, convey, conveys, conveying, conveyed, declare,declares, declaring, declared, deny, denies, denying, denied, disclose, discloses, disclosing,disclosed, exclaim, exclaims, exclaiming, exclaimed, explain, explains, explaining, explained,forecast, forecasts, forecasting, forecasted, foretell, foretells, foretelling, foretold, guarantee,guarantees, guaranteeing, guaranteed, hint, hints, hinting, hinted, insist, insists, insisting,insisted, maintain, maintains, maintaining, maintained, mention, mentions, mentioning,mentioned, object, objects, objecting, objected, predict, predicts, predicting, predicted,proclaim, proclaims, proclaiming, proclaimed, promise, promises, promising, promised,pronounce, pronounces, pronouncing, pronounced, prophesy, prophesies, prophesying,prophesied, protest, protests, protesting, protested, remark, remarks, remarking, remarked,repeat, repeats, repeating, repeated, reply, replies, replying, replied, report, reports,reporting, reported, say, says, saying, said, state, states, stating, stated, submit, submits,submitting, submitted, suggest, suggests, suggesting, suggested, swear, swears, swearing,swore,

		sworn, testify, testifies, testifying, testified, vow, vows, vowing, vowed, warn, warns,warning, warned, write, writes, writing, wrote, written.
RB	Total adverbs	All the adverbs that the Stanford Tagger has already tagged as RB, RBS, RBR or WRB areall re-assigned to the tag RB in order to have a final count of total adverbs.
SERE	Sentence relatives	A sentence relative is counted and tagged every time a punctuation mark is followed by theword which.
SMP	Seem / appear	Any occurrence of any of the forms of the two verbs seemand appear.
SPAU	Split auxiliaries	Split auxiliaries are identified every time an auxiliary (any modal verb MD, or any form ofDO, or any form of BE, or any form of HAVE) is followed by one or two adverbs and a verbbase form.
SPIN	Split infinitives	Split infinitives are identified every time an infinitive marker to is followed by one or twoadverbs and a verb base form.
SPP2	Second person pronouns	Any item of this list: you, your, yourself, yourselves, thy, thee, thyself, thou.
STPR	Stranded preposition	A stranded preposition is identified every time a preposition is followed by a punctuationmark. However, this algorithm was improved by adding that the preposition cannot bebesides, since this word can also be a conjunct and, therefore, usually followed by apunctuation mark.
SUAV	Suasive verbs	This tag finds any of the items listed by Quirk et al. (1985: 1182–3): agree, agrees, agreeing,agreed, allow, allows, allowing, allowed, arrange, arranges, arranging, arranged, ask, asks,asking, asked, beg, begs, begging, begged, command, commands, commanding, commanded,concede, concedes, conceding, conceded, decide, decides, deciding, decided, decree, decrees,decreeing, decreed, demand,

		demands, demanding, demanded, desire, desires, desiring,desired, determine, determines, determining, determined, enjoin, enjoins, enjoining, enjoined,ensure, ensures, ensuring, ensured, entreat, entreats, entreating, entreated, grant, grants,granting, granted, insist, insists, insisting, insisted, instruct, instructs, instructing, instructed,intend, intends, intending, intended, move, moves, moving, moved, ordain, ordains,ordaining, ordained, order, orders, ordering, ordered, pledge, pledges, pledging, pledged,pray, prays, praying, prayed, prefer, prefers, preferring, preferred, pronounce, pronounces,pronouncing, pronounced, propose, proposes, proposing, proposed, recommend, recommends, recommending, recommended, request, requests, requesting, requested,require, requires, requiring, required, resolve, resolves, resolving, resolved, rule, rules,ruling, ruled, stipulate, stipulates, stipulating, stipulated, suggest, suggests, suggesting,suggested, urge, urges, urging, urged, vote, votes, voting, voted,
SYNE	Synthetic negation	The following pattern was identified as synthetic negation: no followed by any adjective(both JJ and PRED) and any noun or proper noun. The words neither and nor were alsotagged as instances of synthetic negation.
THAC	That adjective complements	The program tags as THAC any word that preceded by an adjective (JJ or a predicativeadjective, PRED).
THATD	Subordinator that deletion	The tag THATD is added when one of the following patterns is found: (1) a public, private orsuasive verb followed by a demonstrative pronoun (DEMP) or a subject form of a personalpronoun; (2) a public, private or suasive verb is followed by a pronoun (PRP) or a noun (N)and then by a verb (V) or auxiliary verb; (3) a public, private or

		suasive verb is followed byan adjective (JJ or PRED), an adverb (RB), a determiner (DT, QUAN, CD) or a possessivepronoun (PRP$) and then a noun (N) and then a verb or auxiliary verb, with the possibility ofan intervening adjective (JJ or PRED) between the noun and its preceding word.
THVC	That verb complements	This tag is assigned when the word that is: (1) preceded by and, nor, but, or, also or anypunctuation mark and followed by a determiner (DT, QUAN, CD), a pronoun (PRP), there, aplural noun (NNS) or a proper noun (NNP); (2) preceded by a public, private or suasive verbor a form of seem or appear and followed by any word that is NOT a verb (V), auxiliary verb(MD, form of DO, form of HAVE, form of BE), a punctuation or the word and; (3) precededby a public, private or suasive verb or a form of seem or appear and a preposition and up tofour words that are not nouns (N).
TO	Infinitives	The tag for infinitives is the Stanford Tagger Treebank tag TO. The Stanford Tagger does notdistinguish when the word to is used as an infinitive marker or a preposition. Therefore, analgorithm was implemented to identify instances of to as preposition. This algorithm findsany occurrence of tofollowed by a subordinator (IN), a cardinal number (CD), a determiner(DT), an adjective (JJ), a possessive pronoun (PRP$), WH words (WP$, WDT, WP, WRB), a pre determiner (PDT), a noun (N, NNS, NP, NPs), or a pronoun (PRP) and tags it as a preposition. The remaining instances of to are considered as being infinitive markers and are therefore identifying occurrences of infinitive clauses.
TOBJ	That relative	These are occurrences of that preceded by a noun and

	clauses on object position	followed by a determiner (DT, QUAN,CD), a subject form of a personal pronoun, a possessive pronoun (PRP$), the pronoun it, anadjective (JJ), a plural noun (NNS), a proper noun (NNP) or a possessive noun (a noun (N)followed by a genitive marker (POS)). As Biber specifies, however, this algorithm does notdistinguish between simple complements to nouns and true relative clauses.
TPP3	Third person pronouns	Any item of this list: she, he, they, her, him, them, his, their, himself, herself, themselves.
TSUB	That relative clauses on subject position	These are occurrences of that preceded by a noun (N) and followed by an auxiliary verb or averb (V), with the possibility of an intervening adverb (RB) or negation (XX0).
TTR	Type-token ratio	In Biber (1988), the tagger considered only the first 400 tokens of the text and counted howmany types were present in these 400 tokens. The resulting number was therefore the numberof types in the first 400 words of the text. If a text was shorter than 400 tokens, it wasexcluded from this analysis.The number 400 was chosen by Biber supposedly as it provided a compromise betweenaccuracy and number of texts that could be measured. Since the present tagger can be appliedto corpora of different sizes, it was felt that this number should be left to the user to decide.The tagger will therefore ask to input the number before the tagging starts. It will then counthow many types there are in the first X number of tokens given by the user. For texts shorterthan X, the program will count the types for the whole text. The user can decide whichnumber to use based on either the shortest text in the corpus or perhaps on the statisticalmode of the population of the number of tokens for the whole corpus.By default, this

		number is 400. The variable type-token ratio will be included in thecalculation of Dimension 1 only if the user has not changed the default number. This is done in order to maintain compatibility with Biber's (1988) calculations.
VBD	Past tense	The Stanford Tagger tag VBD is used for this variable
VPRT	Present tense	Any verb that received by the Stanford Tagger a VBP or VBZ tag (present tense or third person present verb) is tagged as VPRT
WHCL	WH-clauses	This tag is assigned when the following pattern is found: any public, private or suasive verbfollowed by any WH word, followed by a word that is NOT an auxiliary (tag MD for modalverbs, or a form of DO, or a form of HAVE, or a form of BE).
WHOBJ	WH relative clauses on object position	This tag is assigned when the following pattern is found: any word that is NOT a form of thewords ASK or TELL followed by any word, followed by a noun (N), followed by any word that is NOT an adverb (RB), a negation (XX0) , a verb or an auxiliary verb (MD, forms ofHAVE, BE or DO).
WHQU	Direct WH-questions	Any punctuation followed by a WH word (what, where, when, how, whether, why, whoever,whomever, whichever, wherever, whenever, whatever, however) and followed by anyauxiliary verb (modal verbs in the form of MD tags or forms of DO or forms of HAVE orforms of BE). This algorithm was slightly changed by allowing an intervening word betweenthe punctuation mark and the WH word. This allows WH-questions containing discoursemarkers such as 'so' or 'anyways' to be recognized. Furthermore, Biber's algorithm wasimproved by excluding WH words such as however or whatever that do not introduce WHquestions.

WHSUB	WH relative clauses on subject position	This tag is assigned when the following pattern is found: any word that is NOT a form of thewords ASK or TELL followed by a noun (N), then a WH pronoun, then by any verb or auxiliary verb (V), with the possibility of an intervening adverb (RB) or negation (XX0)between the WH pronoun and the verb.
WZPAS	Past participial WHIZ deletion relatives	This tag is assigned when the following pattern is found: a noun (N) or quantifier pronoun(QUPR) followed by a past participial form of a verb (VBN) followed by a preposition (PIN)or an adverb (RB) or a form of BE.
WZPRES	Present participial WHIZ deletion relatives	This tag is assigned a present participial form of a verb (VBG) is preceded by a noun (NN).
XX0	Analytic negation	This tag was assigned to the word not and to the item n't_RB.

Appendix D

The Results of Accuracy Checks of the Tagging

Section / Text	Lexico-grammatical Feature	MAT1.3	Woravit, K.	Nutthaporn, O.	Percentage of Accuracy
Introduction / Text 15	TOKENS	221	221	221	100
	AMP	0	0	0	100
	ANDC	3	2	3	83.33
	CAUS	1	1	1	100
	CONC	1	1	1	100
	COND	0	0	0	100
	CONJ	1	1	1	100
	DEMO	3	3	2	83.33
	DEMP	0	0	0	100
	DWNT	1	1	1	100
	EMPH	1	1	1	100
	EX	1	1	1	100
	FPP1	0	0	0	100
	GER	1	1	1	100
	INPR	0	0	0	100
	JJ	23	21	22	93.48
	NEMD	0	0	0	100
	NN	67	67	67	97
	NOMZ	11	10	11	95.45
	OSUB	0	0	0	100
	PHC	2	2	2	100
	PIN	34	32	33	95.59

	PIT	1	1	1	100
	PLACE	0	0	0	100
	POMD	0	0	0	100
	PRED	3	3	2	83.33
	PRMD	0	0	0	100
	RB	6	5	6	91.67
	SPP2	0	0	0	100
	SYNE	0	0	0	100
	THAC	1	1	1	100
	THVC	0	0	0	100
	TIME	0	0	0	100
	TO	4	4	3	87.5
	TOBJ	0	0	0	100
	TPP3	2	2	2	100
	TSUB	0	0	0	100
	VBD	2	2	2	100
	VPRT	14	14	13	96.43
	XXO	0	0	0	100
	BEMA	4	4	3	87.5
	BYPA	1	1	1	100
	PASS	3	3	3	100
	PASTP	0	0	0	100
	PEAS	3	2	3	83.33
	PIRE	0	0	0	100
	PRESP	0	0	0	100
	PRIV	1	1	1	100
	PROD	0	0	0	100
	PUBV	0	0	0	100
	SERE	1	1	1	100
	SMP	0	0	0	100
	SPAU	2	2	2	100

	SPIN	0	0	0	100
	STPR	0	0	0	100
	SUAV	2	2	2	100
	THATD	0	0	0	100
	WHCL	0	0	0	100
	WHOBJ	0	0	0	100
	WHSUB	0	0	0	100
	WHPAST	0	0	0	100
	WZPRES	1	1	1	100
Average Percentage of Accuracy					**98.03**

Section / Text	**Lexico-grammatical Feature**	**MAT1.3**	**Woravit, K.**	**Nutthaporn, O.**	**Percentage of Accuracy**
Methods / Text 30	TOKENS	799	797	799	99.87
	AMP	0	0	0	100
	ANDC	8	7	8	93.75
	CAUS	0	0	0	100
	CONC	0	0	0	100
	COND	1	1	1	100
	CONJ	2	2	2	100
	DEMO	3	3	3	100
	DEMP	2	2	2	100
	DWNT	0	0	0	100
	EMPH	1	1	1	100
	EX	1	1	1	100
	FPP1	0	0	0	100
	GER	2	2	2	100
	INPR	0	0	0	100
	JJ	67	65	66	97.76
	NEMD	0	0	0	100

	NN	265	261	259	98.11
	NOMZ	17	17	17	100
	OSUB	0	0	0	100
	PHC	12	12	12	100
	PIN	79	76	78	97.47
	PIT	0	0	0	100
	PLACE	1	1	1	100
	POMD	0	0	0	100
	PRED	0	0	0	100
	PRMD	0	0	0	100
	RB	16	14	16	93.75
	SPP2	0	0	0	100
	SYNE	2	2	2	100
	THAC	0	0	0	100
	THVC	0	0	0	100
	TIME	3	3	3	100
	TO	8	7	8	93.75
	TOBJ	0	0	0	100
	TPP3	5	5	5	100
	TSUB	2	2	2	100
	VBD	51	48	50	96.08
	VPRT	6	6	6	100
	XXO	1	1	1	100
	BEMA	5	5	5	100
	BYPA	3	3	3	100
	PASS	36	35	34	95.83
	PASTP	0	0	0	100
	PEAS	2	2	2	100
	PIRE	0	0	0	100
	PRESP	0	0	0	100
	PRIV	5	5	5	100

	PROD	0	0	0	100
	PUBV	0	0	0	100
	SERE	2	2	2	100
	SMP	0	0	0	100
	SPAU	0	0	0	100
	SPIN	0	0	0	100
	STPR	1	1	1	100
	SUAV	7	7	7	100
	THATD	1	1	1	100
	WHCL	0	0	0	100
	WHOBJ	0	0	0	100
	WHSUB	4	4	4	100
	WHPAST	5	5	5	100
	WZPRES	3	3	3	100
Average Percentage of Accuracy					**99.46**

Section / Text	**Lexico-grammatical Feature**	**MAT1.3**	**Woravit, K.**	**Nutthaporn, O.**	**Percentage of Accuracy**
Results / Text 45	TOKENS	881	878	875	99.49
	AMP	2	1	2	75
	ANDC	14	12	13	89.29
	CAUS	0	0	0	100
	CONC	2	2	2	100
	COND	1	1	1	100
	CONJ	4	4	4	100
	DEMO	4	4	4	100
	DEMP	3	3	3	100
	DWNT	6	6	6	100
	EMPH	8	8	8	100
	EX	7	7	7	100

	FPP1	0	0	0	100
	GER	1	1	1	100
	INPR	0	0	0	100
	JJ	114	113	112	98.68
	NEMD	0	0	0	100
	NN	248	233	242	95.77
	NOMZ	16	16	16	100
	OSUB	2	2	2	100
	PHC	8	8	8	100
	PIN	86	84	87	99.41
	PIT	0	0	0	100
	PLACE	1	1	1	100
	POMD	1	1	1	100
	PRED	6	5	6	91.67
	PRMD	0	0	0	100
	RB	31	28	30	93.55
	SPP2	0	0	0	100
	SYNE	1	1	1	100
	THAC	0	0	0	100
	THVC	0	0	0	100
	TIME	0	0	0	100
	TO	4	3	4	87.5
	TOBJ	0	0	0	100
	TPP3	1	1	1	100
	TSUB	2	2	2	100
	VBD	57	54	52	92.98
	VPRT	10	8	9	85
	XXO	2	2	2	100
	BEMA	8	8	7	93.75
	BYPA	0	0	0	100
	PASS	13	12	11	88.46

	PASTP	0	0	0	100
	PEAS	0	0	0	100
	PIRE	2	2	2	100
	PRESP	1	1	1	100
	PRIV	10	9	8	85
	PROD	0	0	0	100
	PUBV	5	4	5	90
	SERE	1	1	1	100
	SMP	0	0	0	100
	SPAU	4	4	3	87.5
	SPIN	0	0	0	100
	STPR	1	1	1	100
	SUAV	1	1	1	100
	THATD	0	0	0	100
	WHCL	0	0	0	100
	WHOBJ	0	0	0	100
	WHSUB	0	0	0	100
	WHPAST	4	4	4	100
	WZPRES	1	1	1	100
	Average Percentage of Accuracy				**97.63**

Section / Text	**Lexico-grammatical Feature**	**MAT1.3**	**Woravit, K.**	**Nutthaporn, O.**	**Percentage of Accuracy**
Discussion / Text 60	TOKENS	1,569	1,563	1,572	99.90
	AMP	2	2	2	100
	ANDC	9	7	8	83.33
	CAUS	0	0	0	100
	CONC	1	1	1	100
	COND	1	1	1	100
	CONJ	11	9	13	100

	DEMO	24	26	22	100
	DEMP	8	7	9	100
	DWNT	5	4	6	100
	EMPH	8	7	8	93.75
	EX	4	4	3	87.5
	FPP1	15	13	14	90
	GER	37	33	36	93.24
	INPR	1	1	1	100
	JJ	168	157	163	95.23
	NEMD	0	0	0	100
	NN	421	415	423	99.52
	NOMZ	63	60	64	98.41
	OSUB	2	2	2	100
	PHC	10	7	9	80
	PIN	232	222	237	98.92
	PIT	4	3	3	75
	PLACE	1	1	1	100
	POMD	10	8	11	95
	PRED	15	14	13	90
	PRMD	8	7	7	87.5
	RB	30	26	29	91.67
	SPP2	0	0	0	100
	SYNE	2	2	2	100
	THAC	0	0	0	100
	THVC	8	6	7	81.25
	TIME	0	0	0	100
	TO	13	13	12	96.15
	TOBJ	2	2	2	100
	TPP3	9	7	9	88.89
	TSUB	6	6	5	91.67
	VBD	44	38	43	92.05

	VPRT	37	36	33	93.24
	XXO	11	9	10	86.36
	BEMA	27	26	24	92.59
	BYPA	4	4	4	100
	PASS	10	8	9	85
	PASTP	1	1	1	100
	PEAS	3	3	3	100
	PIRE	4	4	4	100
	PRESP	0	0	0	100
	PRIV	18	17	16	91.67
	PROD	0	0	0	100
	PUBV	8	6	7	81.25
	SERE	2	2	2	100
	SMP	0	0	0	100
	SPAU	0	0	0	100
	SPIN	2	2	2	100
	STPR	0	0	0	100
	SUAV	0	0	0	100
	THATD	1	1	1	100
	WHCL	0	0	0	100
	WHOBJ	0	0	0	100
	WHSUB	2	2	2	100
	WHPAST	2	2	2	100
	WZPRES	7	5	7	85.71
	Average Percentage of Accuracy				**95.56**
	Grand Total Average Percentage of Accuracy				**97.67**

Appendix E

A Four-, Five-, and Six-Component Models OF NURAC

Nursing	Component			
Lexico-grammatical Feature	**1/11**	**2/9**	**3/13**	**4/8**
Predicative Adjectives	.772		.346	
Be as Main Verbs	.758		.326	
Agentless Passives	-.588			
By-Passives	-.584			
Total Adverbs	.558	.316		
Type Token Ratio	-.527			
Analytic Negations	.483		.360	
Emphatics	.469			
Total Prepositional Phrases	.407			
Public Verbs	.401	.306	.369	
Other Adverbial Subordinators	.385			
Existential There				
Present Participial Clauses				
Past Tense	-.347	-.856	-.305	
Present Tense	.372	.804	.477	.306
Average Word Length		.635		.486
Attributive Adjectives		.594		
Perfect Aspects	.312	.588	.336	
Demonstratives	.375	.556	.479	.439
Nominalizations		.538	.415	
Split Auxiliaries	.346	.438		
PhasalCoordinations		.358		
Downtoners				

Possibility Modal	.368	.552	.652	.436
First Person Pronouns			.650	
Conjuncts	.437	.553	.620	
Total Other Nouns	-.519	-.560	-.602	-.520
Pronoun It		.486	.565	
That Verb Complements	.444	.355	.559	
That Relative Clauses on Subject Position			.526	.374
Sentence Ralatives			.504	
That Deletion			.459	
Causative Adverbial Subordinators			.452	
Demonstrative Pronouns	.337		.419	
Private Verbs			.414	
Predictive Modals		.375	.411	
Pire-piping Relative Clauses			.365	
Place Adverbials				
Infinitives		.472	.364	.675
Time Adverbials				.599
Independent Clause Coordination				-.590
Suasive Verbs		.322	.339	.547
Third Person Pronouns				.436
Synthetic Negations				-.419
Gerunds				.375
Wh Relative Clauses on Subject Positions		-.322		.369
Present Participial WHIZ Deletion Relatives				
Past Participial WHIZ Deletion Relatives				

Nursing	Component				
Lexico-grammatical Feature	**1/15**	**2/10**	**3/7**	**4/7**	**5/4**
Past Tense	-.909				
Present Tense	.807				
Average Word Length	.709	-.384			
Attributive Adjectives	.698		-.347		
Perfect Aspects	.609				
Nominalizations	.540				
Demonstratives	.515				
Total Other Nouns	-.487				
Conjuncts	.464				-.302
Infinitives	.451				
Possibility Modal	.449		.319		
Pronoun It	.410				
Split Auxiliaries	.402				
Downtoners	-.344				
Predictive Modals	.308				-.302
Gerunds					
Predicative Adjectives		.716			
Be as Main Verbs		.708			
Agentless Passives	-.335	-.643			
Type Token Ratio		-.630	.312		
By-Passives		-.576			
Emphatics		.506			
Analytic Negations	-.303	.491	.452		
Total Adverbs		.467			
Other Adverbial Subordinators		.420			
Present Participial WHIZ Deletion Relatives		-.363			
Public Verbs					
Pire-piping Relative Clauses			.631		

First Person Pronouns			.601		
Causative Adverbial Subordinators			.577		
That Relative Clauses on Subject Position			.572		
That Deletion			.453		
Sentence Ralatives			.427		
Demonstrative Pronouns			.324		
That Verb Complements					
Place Adverbials					
Independent Clause Coordination				-.684	
Synthetic Negations				-.631	
Time Adverbials				.552	
PhasalCoordinations	.437			-.490	
Past Participial WHIZ Deletion Relatives			-.303	.484	
Total Prepositional Phrases				.375	
Suasive Verbs				.313	
Third Person Pronouns					.643
Private Verbs					-.612
Existential There		.404			.479
Wh Relative Clauses on Subject Positions	-.330	.311		.383	.459
Present Participial Clauses					

Nursing	Component					
Lexico-grammatical Feature	**1/16**	**2/10**	**3/7**	**4/7**	**5/3**	**6/3**
Past Tense	-.913					
Present Tense	.841					
Average Word Length	.692	-.385				
Attributive Adjectives	.659				-.332	
Perfect Aspects	.632					
Nominalizations	.560					
Demonstratives	.536					
Total Other Nouns	-.529					
Conjuncts	.527					
Possibility Modal	.491		.313			
Pronoun It	.463					
Infinitives	.460			.315		
Split Auxiliaries	.423					
Predictive Modals	.344					
Public Verbs	.306					
Downtoners	-.304					
Gerunds						
Predicative Adjectives		.703				
Be as Main Verbs		.697				
Type Token Ratio		-.620				
Agentless Passives	-.349	-.618		.314		
By-Passives		-.563				
Emphatics		.500				
Analytic Negations		.472	.445			
Total Adverbs	.337	.456				
Other Adverbial Subordinators		.412				
Present Participial WHIZ Deletion Relatives		-.347				
Causative Adverbial Subordinators			.578			

First Person Pronouns			.565			
Past Participial WHIZ Deletion Relatives			-.527	.382		
Pire-piping Relative Clauses			.481			
Present Participial Clauses			-.416		.341	
That Verb Complements			.328			
Sentence Ralatives			.312			
Place Adverbials						
Independent Clause Coordination				-.708		
Time Adverbials				.642	-.317	
Synthetic Negations			.308	-.590		
PhasalCoordinations	.426			-.475		
Wh Relative Clauses on Subject Positions	-.349	.321		.432		.403
Total Prepositional Phrases				.428	-.354	-.301
Suasive Verbs				.340		
That Deletion					.787	
That Relative Clauses on Subject Position					.504	
Demonstrative Pronouns					.481	
Third Person Pronouns						.689
Private Verbs					.331	-.550
Existential There		.390				.538

Appendix F

A Six-, Seven-, and Eight-Component Models oF LTRAC

Language Teaching	Component					
Lexcio-grammatical Feature	**1/8**	**2/9**	**3/9**	**4/8**	**5/5**	**6/8**
Perfect Aspects	.792					
Split Auxiliaries	.746				-.343	
Type Token Ratio	.640					
Possibility Modal	.576	.301				
Total Adverbs	.571	.386				
Infinitives	.558					
That Relative Clauses on Subject Position	.545		-.303			
Synthetic Negations	-.339					
Predicative Adjectives		.802				
Be as Main Verbs		.745				
Analytic Negations		.631				
Downtoners		.567				
Emphatics	.339	.553				
Demonstrative Pronouns		.547				
Total Other Nouns	-.345	-.448	-.304			
Predictive Modals		.392				
Existential There		.333	-.303			
Suasive Verbs			.768			
Pronoun It			.557			
That Verb Complements			.554	.434		
Independent Clause Coordination			-.525			
Private Verbs			.463			

Wh Relative Clauses on Subject Positions			.461			
That Deletion			.404		.389	
Other Adverbial Subordinators			.383			
Place Adverbials			-.343			
Agentless Passives				-.775		
Past Tense	-.374			-.761		
Present Tense	.315			.629		
Past Participial WHIZ Deletion Relatives	.322			-.604		
Conjuncts				.455		
Attributive Adjectives				.410	-.308	
PhasalCoordinations	.353	-.316		.386		
Nominalizations				.312		
Total Prepositional Phrases						
First Person Pronouns					.712	
Public Verbs					.667	
Third Person Pronouns					.626	
Causative Adverbial Subordinators		.419			.556	
By-Passives			.420		-.449	
Gerunds						.732
Present Participial WHIZ Deletion Relatives						.597
Average Word Length	.443					.525
Time Adverbials						-.420
Pire-piping Relative Clauses						-.388
Present Participial Clauses						.364
Demonstratives						.360
Sentence Ralatives						-.347

Language Teaching	Component						
	1/9	2/8	3/9	4/8	5/4	6/3	7/7
Predicative Adjectives	.828						
Be as Main Verbs	.823						
Analytic Negations	.650						
Predictive Modals	.587						
Demonstrative Pronouns	.489						
Demonstratives	.442					.393	
Total Other Nouns	-.430	-.320					
Downtoners	.413					-.375	
Place Adverbials	-.310						
Perfect Aspects		.774					
That Relative Clauses on Subject Position		.680					
Split Auxiliaries		.665			-.368		
Type Token Ratio		.649					
Infinitives		.544		.302			
Possibility Modal		.519					
Total Adverbs	.429	.460					
Emphatics	.335	.456				-.334	
Past Tense		-.316	-.784				
Agentless Passives			-.750		-.316		
Present Tense			.634	.334			
Past Participial WHIZ Deletion Relatives		.396	-.598				
Conjuncts			.466				
PhasalCoordinations			.434			.401	
Attributive Adjectives			.427				
Nominalizations			.332				
Total Prepositional Phrases			.315				
Suasive Verbs				.792			

That Verb Complements			.405	.635			
Pronoun It				.535			
By-Passives				.506	-.415		
Independent Clause Coordination				-.489			
That Deletion				.484	.408		
Private Verbs				.454			
Wh Relative Clauses on Subject Positions				.391			
First Person Pronouns					.714		
Public Verbs					.678		
Causative Adverbial Subordinators					.605		
Third Person Pronouns					.564	.391	
Existential There						-.639	
Synthetic Negations						-.638	
Other Adverbial Subordinators	.352					.541	
Gerunds							.690
Present Participial WHIZ Deletion Relatives							.598
Average Word Length		.312				.322	.482
Pire-piping Relative Clauses							-.430
Time Adverbials							-.421
Sentence Ralatives							-.363
Present Participial Clauses							.354

Language Teaching	Component						
	1	2	3	4	5	7	8
Perfect Aspects	.860						
That Relative Clauses on Subject Position	.738						
Infinitives	.592			.316			
Type Token Ratio	.583						
Possibility Modal	.579	.300					
Split Auxiliaries	.558				-.320		
Emphatics	.530	.352					-.303
Total Adverbs	.359	.312					
Predicative Adjectives		.816					
Be as Main Verbs		.815					
Predictive Modals		.667					
Analytic Negations		.640					
Demonstratives		.543					.389
Demonstrative Pronouns		.392					
Total Other Nouns		-.306					
Agentless Passives			-.723				
Past Tense	-.401		-.693				
Past Participial WHIZ Deletion Relatives	.450		-.644				
Conjuncts			.581				
Present Tense	.364		.579	.330			
Attributive Adjectives			.518			.348	
Nominalizations			.384				
Suasive Verbs				.795			
That Verb Complements			.471	.630			
Pronoun It	.358			.539			
By-Passives				.510	-.382		
That Deletion				.507	.433		

Private Verbs				.469			
Independent Clause Coordination		-.380		-.461			
Wh Relative Clauses on Subject Positions				.376			.311
Place Adverbials							
First Person Pronouns					.734		
Public Verbs					.679		
Causative Adverbial Subordinators					.573		
Third Person Pronouns					.570		.381
Gerunds						.736	
Average Word Length						.648	
Present Participial WHIZ Deletion Relatives						.570	
Present Participial Clauses						.466	
Time Adverbials						-.431	
Total Prepositional Phrases						-.329	
Existential There						-.304	-.602
Synthetic Negations						-.365	-.539
PhasalCoordinations			.321				.513
Downtoners							-.499
Sentence Ralatives							
Pire-piping Relative Clauses							
Other Adverbial Subordinators	-.338	.336					.424

Appendix G

The Results of Anovas and Post Hoc Scheffe in Each Dimension

NURAC Dimension I: Evaluative Stance Focused

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2559.038	3	853.013	49.292	.000
Within Groups	2007.396	116	17.305		
Total	4566.435	119			

Multiple Comparisons

(I) Section	(J) Section	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Introduction	**Methods**	9.1953333*	1.0740931	.000	6.148158	12.242509
	Results	-.0863333	1.0740931	1.000	-3.133509	2.960842
	Discussion	-3.1170000*	1.0740931	.043	-6.164176	-.069824
Methods	**Introduction**	-9.1953333*	1.0740931	.000	-12.242509	-6.148158
	Results	-9.2816667*	1.0740931	.000	-12.328842	-6.234491
	Discussion	-12.3123333*	1.0740931	.000	-15.359509	-9.265158
Results	**Introduction**	.0863333	1.0740931	1.000	-2.960842	3.133509
	Methods	9.2816667*	1.0740931	.000	6.234491	12.328842
	Discussion	-3.0306667	1.0740931	.052	-6.077842	.016509
Discussion	**Introduction**	3.1170000*	1.0740931	.043	.069824	6.164176
	Methods	12.3123333*	1.0740931	.000	9.265158	15.359509
	Results	3.0306667	1.0740931	.052	-.016509	6.077842

*. The mean difference is significant at the 0.05 level.

NURAC Dimension II: Established Knowledge Focused

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3243.057	3	1081.019	107.183	.000
Within Groups	1169.945	116	10.086		
Total	4413.002	119			

Multiple Comparisons

(I) Section	(J) Section	Mean Difference (I-J)	Std. Error	Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound
Introduction	**Methods**	10.2403333*	.8199892	.000	7.415817	13.064850
	Results	12.6663333*	.8199892	.000	9.841817	15.490850
	Discussion	2.7766667	.8199892	.012	-.047850	5.601183
Methods	**Introduction**	-10.2403333*	.8199892	.000	-13.064850	-7.415817
	Results	2.4260000	.8199892	.037	-.398516	5.250516
	Discussion	-7.4636667*	.8199892	.000	-10.288183	-4.639150
Results	**Introduction**	-12.6663333*	.8199892	.000	-15.490850	-9.841817
	Methods	-2.4260000	.8199892	.037	-5.250516	.398516
	Discussion	-9.8896667*	.8199892	.000	-12.714183	-7.065150
Discussion	**Introduction**	-2.7766667	.8199892	.012	-5.601183	.047850
	Methods	7.4636667*	.8199892	.000	4.639150	10.288183
	Results	9.8896667*	.8199892	.000	7.065150	12.714183

*. The mean difference is significant at the 0.05 level.

NURAC Dimension III: Claim Focused

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4038.629	3	1346.210	64.703	.000
Within Groups	2413.504	116	20.806		
Total	6452.133	119			

Multiple Comparisons

(I) Section	(J) Section	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Introduction	**Methods**	7.3206667*	1.1777398	.000	3.979448	10.661885
	Results	7.1883333*	1.1777398	.000	3.847115	10.529552
	Discussion	-6.6833333*	1.1777398	.000	-10.024552	-3.342115
Methods	**Introduction**	-7.3206667*	1.1777398	.000	-10.661885	-3.979448
	Results	-.1323333	1.1777398	1.000	-3.473552	3.208885
	Discussion	-14.0040000*	1.1777398	.000	-17.345219	-10.662781

Results	**Introduction**	-7.1883333*	1.1777398	.000	-10.529552	-3.847115
	Methods	.1323333	1.1777398	1.000	-3.208885	3.473552
	Discussion	-13.8716667*	1.1777398	.000	-17.212885	-10.530448
Discussion	**Introduction**	6.6833333*	1.1777398	.000	3.342115	10.024552
	Methods	14.0040000*	1.1777398	.000	10.662781	17.345219
	Results	13.8716667*	1.1777398	.000	10.530448	17.212885

*. The mean difference is significant at the 0.05 level

NURAC Dimension IV: Intention Focused

ANOVA

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	573.404	3	191.135	13.485	.000
Within Groups	1644.175	116	14.174		
Total	2217.579	119			

Multiple Comparisons

(I) Section	(J) Section	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Introduction	**Methods**	1.1356667	.9720742	.714	-1.622084	3.893417
	Results	5.1003333*	.9720742	.000	2.342583	7.858084
	Discussion	-.4440000	.9720742	.976	-3.201750	2.313750
Methods	**Introduction**	-1.1356667	.9720742	.714	-3.893417	1.622084
	Results	3.9646667*	.9720742	.001	1.206916	6.722417
	Discussion	-1.5796667	.9720742	.454	-4.337417	1.178084
Results	**Introduction**	-5.1003333*	.9720742	.000	-7.858084	-2.342583
	Methods	-3.9646667*	.9720742	.001	-6.722417	-1.206916
	Discussion	-5.5443333*	.9720742	.000	-8.302084	-2.786583
Discussion	**Introduction**	.4440000	.9720742	.976	-2.313750	3.201750
	Methods	1.5796667	.9720742	.454	-1.178084	4.337417
	Results	5.5443333*	.9720742	.000	2.786583	8.302084

*. The mean difference is significant at the 0.05 level

LTRAC Dimension I: Persuasion Focused

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	810.908	3	270.303	19.090	.000
Within Groups	1642.462	116	14.159		
Total	2453.370	119			

Multiple Comparisons

(I) Section	(J) Section	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Introduction	**Methods**	4.1686667*	.9715675	.001	1.412354	6.924980
	Results	5.9146667*	.9715675	.000	3.158354	8.670980
	Discussion	-.0173333	.9715675	1.000	-2.773646	2.738980
Methods	**Introduction**	-4.1686667*	.9715675	.001	-6.924980	-1.412354
	Results	1.7460000	.9715675	.362	-1.010313	4.502313
	Discussion	-4.1860000*	.9715675	.001	-6.942313	-1.429687

Results	**Introduction**	-5.9146667*	.9715675	.000	-8.670980	-3.158354
	Methods	-1.7460000	.9715675	.362	-4.502313	1.010313
	Discussion	-5.9320000*	.9715675	.000	-8.688313	-3.175687
Discussion	**Introduction**	.0173333	.9715675	1.000	-2.738980	2.773646
	Methods	4.1860000*	.9715675	.001	1.429687	6.942313
	Results	5.9320000*	.9715675	.000	3.175687	8.688313

*. The mean difference is significant at the 0.05 level.

LTRAC Dimension II: Evaluative Stance Focused

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	775.128	3	258.376	13.174	.000
Within Groups	2275.000	116	19.612		
Total	3050.128	119			

Multiple Comparisons

(I) Section	(J) Section	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Introduction	**Methods**	2.7250000	1.1434472	.135	-.518931	5.968931
	Results	-1.2773333	1.1434472	.742	-4.521265	1.966598
	Discussion	-4.3450000*	1.1434472	.003	-7.588931	-1.101069
Methods	**Introduction**	-2.7250000	1.1434472	.135	-5.968931	.518931
	Results	-4.0023333*	1.1434472	.008	-7.246265	-.758402
	Discussion	-7.0700000*	1.1434472	.000	-10.313931	-3.826069
Results	**Introduction**	1.2773333	1.1434472	.742	-1.966598	4.521265
	Methods	4.0023333*	1.1434472	.008	.758402	7.246265
	Discussion	-3.0676667	1.1434472	.071	-6.311598	.176265
Discussion	**Introduction**	4.3450000*	1.1434472	.003	1.101069	7.588931
	Methods	7.0700000*	1.1434472	.000	3.826069	10.313931
	Results	3.0676667	1.1434472	.071	-.176265	6.311598

*. The mean difference is significant at the 0.05 level

LTRAC Dimension III: Claim Focused

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	371.076	3	123.692	6.354	.001
Within Groups	2258.310	116	19.468		
Total	2629.386	119			

Multiple Comparisons

(I) Section	(J) Section	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Introduction	**Methods**	2.8190000	1.1392451	.112	-.413010	6.051010
	Results	.5310000	1.1392451	.975	-2.701010	3.763010
	Discussion	-2.1250000	1.1392451	.328	-5.357010	1.107010
Methods	**Introduction**	-2.8190000	1.1392451	.112	-6.051010	.413010
	Results	-2.2880000	1.1392451	.263	-5.520010	.944010
	Discussion	-4.9440000*	1.1392451	.001	-8.176010	-1.711990

Results	**Introduction**	-.5310000	1.1392451	.975	-3.763010	2.701010
	Methods	2.2880000	1.1392451	.263	-.944010	5.520010
	Discussion	-2.6560000	1.1392451	.149	-5.888010	.576010
Discussion	**Introduction**	2.1250000	1.1392451	.328	-1.107010	5.357010
	Methods	4.9440000*	1.1392451	.001	1.711990	8.176010
	Results	2.6560000	1.1392451	.149	-.576010	5.888010

*. The mean difference is significant at the 0.05 level

LTRAC Dimension IV: Established Knowledge versus Past Action Focused

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1377.414	3	459.138	35.804	.000
Within Groups	1487.548	116	12.824		
Total	2864.962	119			

Multiple Comparisons

(I) Section	(J) Section	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Introduction	**Methods**	9.0130000*	.9246148	.000	6.389891	11.636109
	Results	5.3206667*	.9246148	.000	2.697557	7.943776
	Discussion	2.2336667	.9246148	.126	-.389443	4.856776
Methods	**Introduction**	-9.0130000*	.9246148	.000	-11.636109	-6.389891
	Results	-3.6923333*	.9246148	.002	-6.315443	-1.069224
	Discussion	-6.7793333*	.9246148	.000	-9.402443	-4.156224
Results	**Introduction**	-5.3206667*	.9246148	.000	-7.943776	-2.697557
	Methods	3.6923333*	.9246148	.002	1.069224	6.315443
	Discussion	-3.0870000*	.9246148	.014	-5.710109	-.463891
Discussion	**Introduction**	-2.2336667	.9246148	.126	-4.856776	.389443
	Methods	6.7793333*	.9246148	.000	4.156224	9.402443
	Results	3.0870000*	.9246148	.014	.463891	5.710109

*. The mean difference is significant at the 0.05 level

LTRAC Dimension V: Ownership Focused

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	35.817	3	11.939	1.161	.328
Within Groups	1192.425	116	10.280		
Total	1228.242	119			

Multiple Comparisons

(I) Section	(J) Section	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Introduction	**Methods**	-.1896667	.8278295	.997	-2.538198	2.158865
	Results	-.8173333	.8278295	.807	-3.165865	1.531198
	Discussion	-1.3863333	.8278295	.426	-3.734865	.962198
Methods	**Introduction**	.1896667	.8278295	.997	-2.158865	2.538198
	Results	-.6276667	.8278295	.902	-2.976198	1.720865
	Discussion	-1.1966667	.8278295	.556	-3.545198	1.151865
Results	**Introduction**	.8173333	.8278295	.807	-1.531198	3.165865
	Methods	.6276667	.8278295	.902	-1.720865	2.976198

	Discussion	-.5690000	.8278295	.925	-2.917532	1.779532
Discussion	**Introduction**	1.3863333	.8278295	.426	-.962198	3.734865
	Methods	1.1966667	.8278295	.556	-1.151865	3.545198
	Results	.5690000	.8278295	.925	-1.779532	2.917532

*. The mean difference is significant at the 0.05 level

LTRAC Dimension VI: Modified Information Focused

ANOVA

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	204.734	3	68.245	5.294	.002
Within Groups	1495.261	116	12.890		
Total	1699.995	119			

Multiple Comparisons

(I) Section	(J) Section	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Introduction	**Methods**	1.5406667	.9270087	.433	-1.089234	4.170567
	Results	2.8873333*	.9270087	.025	.257433	5.517234
	Discussion	-.4036667	.9270087	.979	-3.033567	2.226234
Methods	**Introduction**	-1.5406667	.9270087	.433	-4.170567	1.089234
	Results	1.3466667	.9270087	.552	-1.283234	3.976567
	Discussion	-1.9443333	.9270087	.227	-4.574234	.685567
Results	**Introduction**	-2.8873333*	.9270087	.025	-5.517234	-.257433
	Methods	-1.3466667	.9270087	.552	-3.976567	1.283234
	Discussion	-3.2910000*	.9270087	.007	-5.920901	-.661099
Discussion	**Introduction**	.4036667	.9270087	.979	-2.226234	3.033567
	Methods	1.9443333	.9270087	.227	-.685567	4.574234
	Results	3.2910000*	.9270087	.007	.661099	5.920901

*. The mean difference is significant at the 0.05 level

BIOGRAPHY

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